Environmental Assessment

for

Improvements to the

I-195/Taunton Avenue/Warren Avenue Interchange

East Providence, Rhode Island

Rhode Island Department of Transportation
and the
U.S. Department of Transportation
Federal Highway Administration

December 2007

FEDERAL HIGHWAY ADMINISTRATION
FINDING OF NO SIGNIFICANT IMPACT

Environmental Assessment
Improvements to I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

The Federal Highway Administration (FHWA) has determined that construction of Waterfront Drive 2 alternative, which involves constructing a new ramp from I-195 westbound to Waterfront Drive, a new ramp from Warren Avenue to I-195, a roundabout at Veterans Memorial Parkway and Mauran Avenue, and an extension of Taunton Avenue, as described in the attached Environmental Assessment (EA) dated December 2007, will have no significant impact on the human environment. This Finding of No Significant Impact (FONSI) has been based on the EA prepared by the Rhode Island Department of Transportation, which was independently evaluated by the FHWA and determined to adequately and accurately discuss the need, environmental issues, and impacts of the proposed project and appropriate mitigation measures.

The following summarizes mitigation identified in the EA.

- The preferred alternative involves construction through property that may be contaminated with hazardous material. Should additional studies reveal that there is soil and/or groundwater contamination, precautions will be taken during construction to protect workers and to ensure that the contamination is not spread. Excavated contaminated soil will be removed and transported to appropriate offsite facilities, or if the soil meets applicable criteria, the soil will be used elsewhere on the project.

- The incremental increase in noise impacts is insignificant when comparing the build alternatives to the No-build option. However, the projected noise levels for all of the alternatives are high enough to warrant consideration of mitigation. During the final design phase of the project, noise mitigation will be evaluated and implemented where deemed reasonable, feasible, and acceptable by the community.

- The preferred alternative affects six properties and requires acquisition of four buildings. The acquisition and relocation program will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

The EA provides sufficient evidence and analysis for determining that an Environmental Impact Statement (EIS) is not required. The FHWA takes full responsibility for the accuracy, scope, and content of the attached EA.

1/25/2008
Date

Peter W. Osborn
Division Administrator

Table of Contents

Table of Contents
(continued)

Technical Memoranda (bound separately)

List of Tables

List of Figures

1.0 PURPOSE AND NEED

1.1 Project Purpose

The purpose of the project for Improvements to the I-195/Taunton Avenue/Warren Avenue Interchange is to:

- improve access to and from Interstate Route 195 at the existing interchange
- reduce congestion and improve traffic operations within the vicinity of the interchange
- reduce accident levels within the immediate vicinity of the interchange
- adequately prepare for currently projected growth and related transportation needs within the effective design life of the facility.

1.2 Project Need

The need for transportation improvements at this location is summarized as follows:

- The existing interchange is not a full-service interchange. There are no connections either to or from the east on I-195.
- Motorists wishing to access I-195 to the east or egress I-195 from the east in the vicinity of the interchange are forced to use already-busy arterial streets to get to/from the next interchange.
- The alternative access/egress route currently favored by motorists takes them through three high-accident intersections. Reduction of traffic volume on these alternative routes will directly reduce the number of accidents and increase the opportunity for additional transportation enhancements.
- Traffic growth in the study area will continue to worsen traffic operations, affecting both capacity and safety. RIDOT traffic data indicate that volumes have grown at the rate of over one percent per year in this corridor over the last fourteen years.
- In addition to normal growth in traffic volumes, significant development of the East Providence waterfront is also expected to take place within the project life for the transportation improvements being planned in this Environmental Assessment. Recent projects such as Waterfront Drive serve to accommodate north-south travel and improve local access to the highway system. However, improved access to and

from the east has not been provided. It is estimated that the sections of the waterfront that will influence the subject interchange will generate approximately 61,000 trips per day when fully developed. Accounting for that planned future development in the project area, traffic is expected to grow by approximately 40-percent by the year 2030. Conditions will deteriorate as traffic volumes increase if measures are not taken.

In addition, while it is not a direct purpose or need of this project, it is intended that the project be developed in a manner which recognizes the context (that is to say the community, history, aesthetics, safety and environment) of the immediate locale, and seeks to address related public concerns as much as is practical.

1.3 Project History

The I-195/Taunton Avenue/Warren Avenue Interchange area includes Interstate Route 195 from the east shore of the Seekonk River, and easternmost end of the Washington Bridge, through the Taunton Avenue and Warren Avenue exit ramps. The area also includes the Potter Street and Purchase Street overpass bridges and the soon-to-be-completed southernmost section of Waterfront Drive. The existing Taunton Avenue and Warren Avenue eastbound off-ramps are designated as Exits 4 and 5, respectively, on I-195. The study area is shown in Figure 1.

Interstate 195 is a major Rhode Island expressway with three or more lanes in each direction providing access between downtown Providence and Interstate Route 95 and East Providence and points east. The Taunton Avenue and Warren Avenue exit and entrance ramps provide access to points north and south of I-195 in the westernmost section of East Providence. The interchange's present configuration results from several previous highway construction contracts that were built independently, spanning a period of over 75 years.

In the late 1920s, the original Washington Bridge was constructed across the Seekonk River to provide greater access to East Providence and points east. The bridge had direct access to both Taunton Avenue and Warren Avenue. That configuration remained in place through the 1950s. The original Washington Bridge is currently the southern span of the Washington Bridge and carries eastbound traffic on I-195.

By 1962, with the construction of Interstate 195 through East Providence completed, the interchange configuration changed. The Washington Bridge now connected directly to the interstate, and access to Taunton Avenue and Warren Avenue was provided by access ramps.

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195 / Taunton Ave. / Warren Ave. Interchange

East Providence, Rhode Island

STUDY AREA

SCALE: 1" = 600'

FIGURE 1

This configuration was in place until the construction of the north span of the Washington Bridge in 1970. The revised configuration implemented at that time remained essentially unchanged throughout the 1970s, 1980s and 1990s.

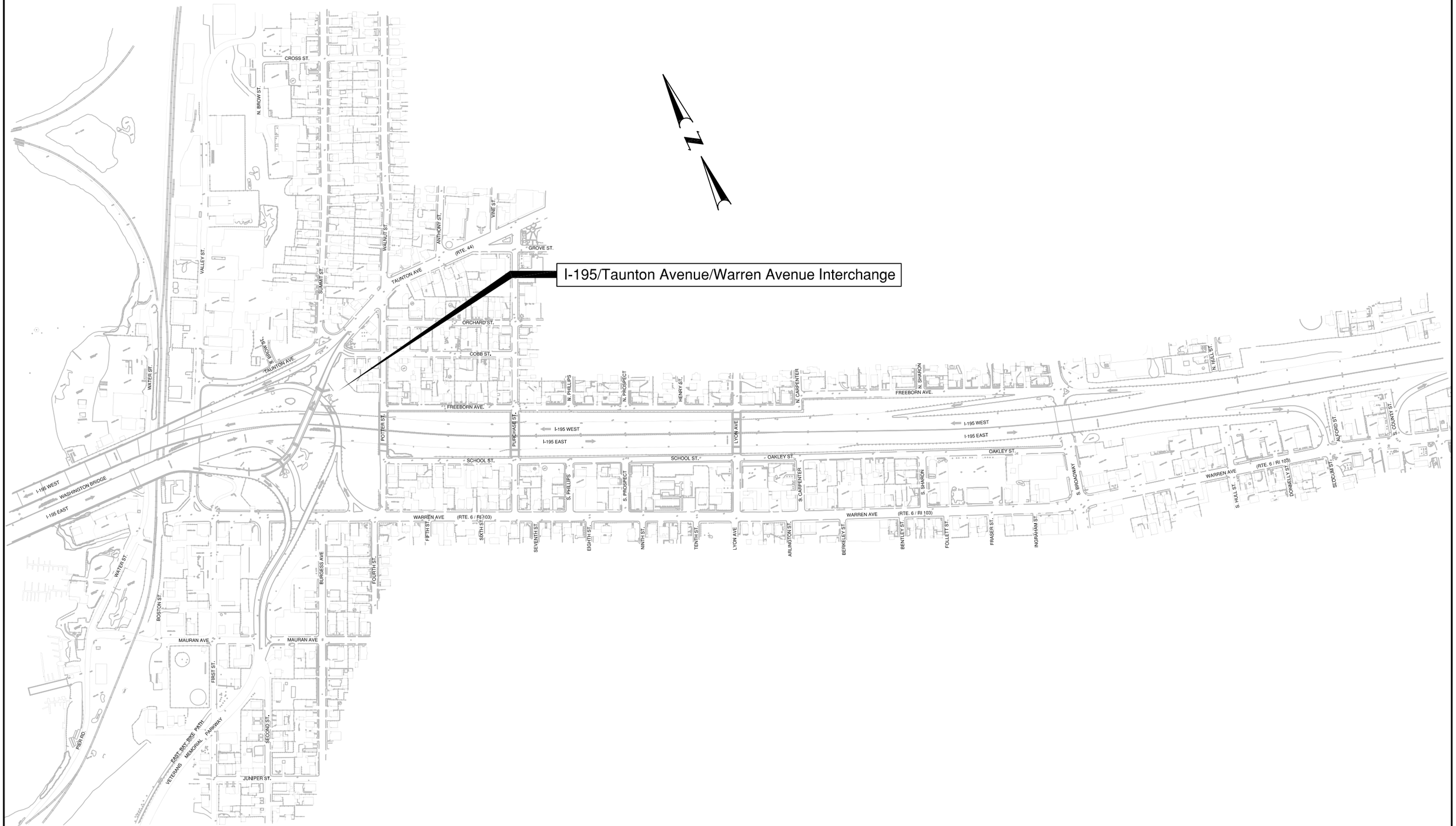
In 2004, construction began on a project to replace the bridge in the eastbound Taunton Avenue off-ramp, which required a slight relocation of that ramp. That project was completed in 2005. Construction has also begun on the new south span of the Washington Bridge. That span will move northerly, closer to the north span, with a part of the existing south span to remain as a bicycle and pedestrian pathway. In yet another RIDOT project, the southernmost section of the proposed Waterfront Drive will be completed within the next couple of years.

1.4 Existing Conditions

As described above and as shown on the project graphics, the existing interchange is a partial interchange, in that it does not provide connections to and from the east on I-195. Presently, motorists in the project area seek access to I-195 eastbound via Warren Avenue to the I-195 on-ramp at South County Street, east of Broadway. The reverse movement is accomplished by exiting I-195 westbound at Exit 6 onto Broadway, and then traveling to Warren Avenue to reach areas in the western portion of East Providence. Refer to Figure 2 which shows the 2004 Existing Conditions.

Warren Avenue is a major east-west route through this section of East Providence. It is designated as U.S. Route 6 and R.I. Route 103, and it is functionally classified as an urban minor arterial highway according to Technical Paper No. 130, *Highway Functional Classification System for the State of Rhode Island, 1995-2005*, published by the Rhode Island Statewide Planning Program. Warren Avenue provides one lane of travel in each direction. Although the width varies, it is generally 40 feet wide from Valley Street to Broadway, containing two 12-foot travel lanes and two 8-foot parking lanes. Warren Avenue widens to 44 feet between Broadway and the I-195 eastbound ramps, still providing two 12-foot travel lanes, but with two 10-foot parking lanes. Adjacent land use is densely developed as a mix of residential and commercial buildings.

The route from the western section of East Providence to I-195 eastbound includes signalized intersections at Warren Avenue/Lyon Avenue, Warren Avenue/Broadway, Warren Avenue/I-195 eastbound off-ramp and Broadway/Freeborn Avenue/I-195 westbound ramps.



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

2004 EXISTING CONDITION

SCALE 1"=400'

FIGURE 2

There are numerous bridge structures in the project area. The findings of recent inspections have been reviewed. Each bridge is classified based upon a structural evaluation coding, which is based upon the HS load ratings and sufficiency ratings. The HS load ratings refer to the American Association of State Highway and Transportation Officials (AASHTO) standard design truck loadings. The existing bridges in the project area that were not recently constructed have structural evaluation codes of 4, 5 or 6. A structural evaluation code 4 is indicative of poor condition, code 5 is fair condition and code 6 is satisfactory condition. A summary of the latest bridge inspection information is provided in Figure 3.

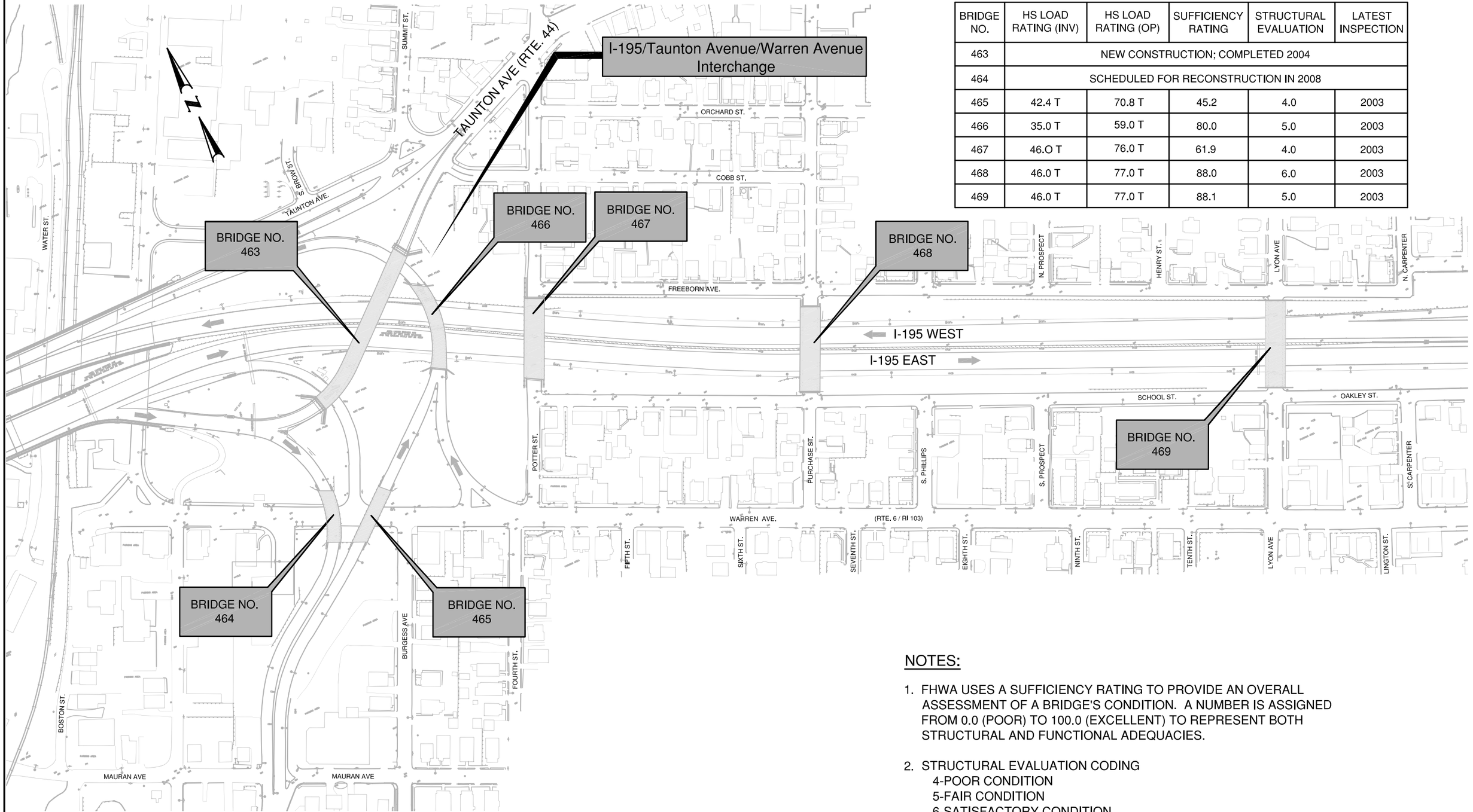
1.5 Committed Projects

Figure 4, 2009 Base Map with Committed Projects, shows the existing roadway network together with selected improvements that are already committed by the RIDOT. The elements shown on the graphic are described below.

- As of the writing of this Environmental Assessment, the replacement of the south span of the Washington Bridge was under construction. Figure 4 shows the new southern span in its final position, close to the northern span, with a section of the old southern span in place as a pedestrian and bicycle path. All connections to I-195 and the ramps are shown as they will be following the completion of construction.
- Also shown on Figure 4 is the Warren Avenue Connector, which consists of the westerly extension of Warren Avenue together with the southernmost section of the future Waterfront Drive, from Warren Avenue southerly to Bold Point. Construction bids for that project were received in April 2006, with completion expected by September 2007.
- Rehabilitation of Bridge 464, which carries the I-195 eastbound off-ramp to Veterans Memorial Parkway over Warren Avenue, will undergo a major rehabilitation in 2008. This project is for the bridge rehabilitation only, with virtually no changes to the roadway or ramp configurations. The rehabilitated bridge will be only approximately two feet wider than the existing bridge.

For the purposes of evaluating existing conditions and developing and evaluating alternatives for this interchange improvement project, the roadway network shown on Figure 4 has been utilized as the base condition.

In addition to the projects listed above, the following bridge projects involve bridges in the study area:



BRIDGE NO.	HS LOAD RATING (INV)	HS LOAD RATING (OP)	SUFFICIENCY RATING	STRUCTURAL EVALUATION	LATEST INSPECTION
463	NEW CONSTRUCTION; COMPLETED 2004				
464	SCHEDULED FOR RECONSTRUCTION IN 2008				
465	42.4 T	70.8 T	45.2	4.0	2003
466	35.0 T	59.0 T	80.0	5.0	2003
467	46.O T	76.0 T	61.9	4.0	2003
468	46.0 T	77.0 T	88.0	6.0	2003
469	46.0 T	77.0 T	88.1	5.0	2003

NOTES:

1. FHWA USES A SUFFICIENCY RATING TO PROVIDE AN OVERALL ASSESSMENT OF A BRIDGE'S CONDITION. A NUMBER IS ASSIGNED FROM 0.0 (POOR) TO 100.0 (EXCELLENT) TO REPRESENT BOTH STRUCTURAL AND FUNCTIONAL ADEQUACIES.

2. STRUCTURAL EVALUATION CODING
   4-POOR CONDITION
   5-FAIR CONDITION
   6-SATISFACTORY CONDITION

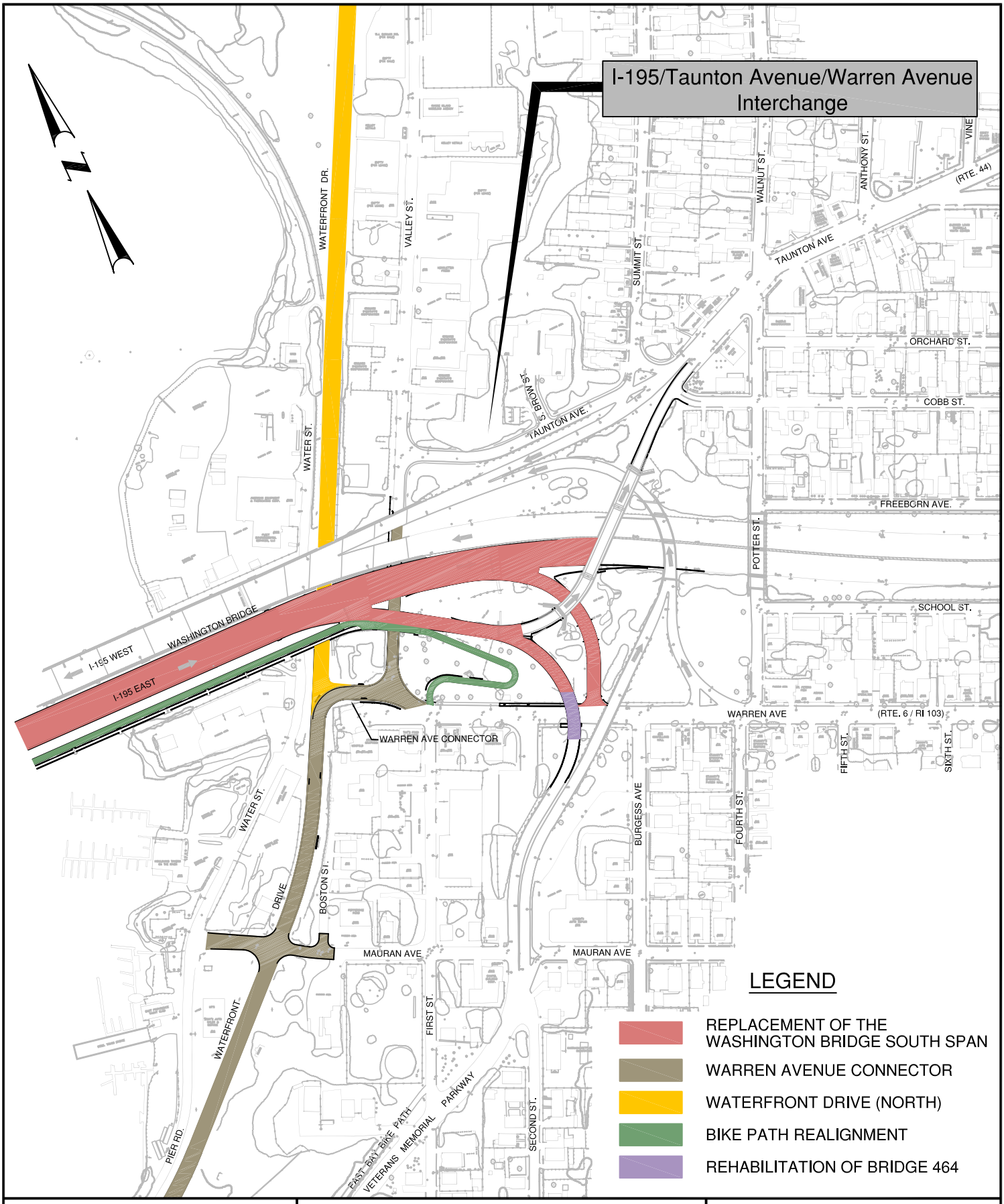
Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

EXISTING BRIDGE CONDITION SUMMARY
AUGUST 24, 2005

SCALE 1"=200'

FIGURE 3



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2009 BASE MAP WITH COMMITTED PROJECTS

SCALE 1"=300'

FIGURE 4

- I-195 Improvements Phase 2. This project, currently in the design stage, is a follow up contract to a resurfacing contract that was done in 2000. The project involves drainage work, lighting work, friction course installation, barrier painting, and miscellaneous bridge rehabilitation/repair work at four bridges including Warren Avenue Bridge #465, Potter Street Bridge #467, Purchase Street Bridge #468, and Lyon Avenue Bridge #469.
- Improvements to I-195 and Rehabilitation of Pawtucket Avenue Bridge #471 and Horton Farm Bridge #472. As part of this project, the Pawtucket Avenue Bridge #471 will undergo replacement of the superstructure and partial replacement of the substructure along with other rehabilitation. The Horton Farm Bridge #472 will undergo minor rehabilitation and approach improvements. Drainage and highway lighting work will be conducted on I-195 and the highway will be repaved between Warren Avenue and Broadway bridges. The project is currently at the 30% design stage.
- Rehabilitation of Broadway Bridge #470. Currently under construction, this project involves the replacement of the superstructure and partial substructure, bridge rehabilitation, replacement of highway lighting, drainage improvements, and repaving of highway approaches.
- Improvements to Interstate 195 and Rehabilitation of Warren Avenue Bridge #473. The construction of this project is almost completed. Along with other rehabilitation, this project involved superstructure and partial substructure replacement, highway lighting replacement, drainage improvements, and repaving of I-195 from the Massachusetts state line west to just before Horton Farm Bridge #472.

Although it falls outside the project limits, the Relocation of the I-195 Project, across the Providence River in Providence, is in close proximity to this interchange. The Relocation of I-195 is currently underway as a series of construction contracts that will relocate that section of the existing freeway southerly. As a result, the I-95/I-195 interchange will move southerly, as well. The new section of I-195 will cross the Providence River on the new Iway Signature Bridge, which will be located south of the Providence Hurricane Barrier. That project will increase safety and efficiency of traffic flow on I-195 by providing a consistent eight-lane cross section and by consolidating interchanges such that there will be fewer entrances and exits than under the existing conditions.

2.0 ALTERNATIVES

2.1 General

Five alternatives were considered for the I-195/Taunton Avenue/Warren Avenue interchange. Each alternative is described in the sections to follow. The five alternatives under study include a No-build alternative, an Upgrade/TSM alternative, and three build alternatives.

2.2 No-build Alternative

The No-build alternative is the base condition against which the other alternatives are compared. Under this option, the existing roadway network is maintained, with no major modifications. Options for access to I-195 would remain the same in the future as they are today. As discussed in Section 1.5, selected committed projects by RIDOT are considered to be part of the No-build condition.

2.3 Upgrade/TSM Alternative

In a transportation improvement study such as this one, the development and evaluation of alternatives must include options that are less in scope than those that involve the construction of new roadways. The intention of investigating this type of alternative is to determine whether the project purpose and need can be satisfied through improvements to the existing highway system that do not involve new construction.

Often, the hierarchy of alternatives includes separate consideration of an Upgrade Alternative and a Transportation Systems Management (TSM) Alternative, thereby covering two different levels of improvement that do not include new construction. An Upgrade Alternative usually involves substantial reconstruction and/or widening of existing roadways to increase capacity, frequently requiring right-of-way acquisition to achieve the project objectives. The TSM concept is of a lesser scope, typically aimed at improving the efficiency of the existing highway operations without major construction activities. Common considerations within this concept include localized improvements at intersections, improvements to the operations at traffic signals or the interconnection of signals to form coordinated systems.

For reasons described below, the Upgrade and TSM Alternatives for this Environmental Assessment have been combined into one alternative.

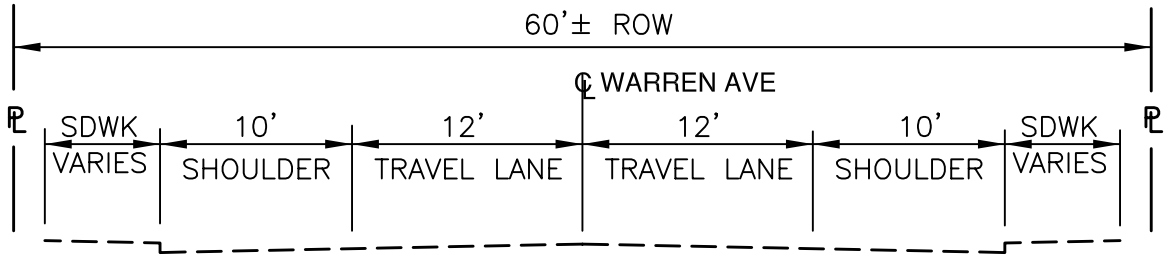
The goal of an Upgrade Alternative in this study area would be to improve the existing routes to and from I-195 to the east without the construction of new ramps and/or roadways. Warren Avenue is the predominant route to and from I-195 to the east from the vicinity of the I-195/Taunton Avenue/Warren Avenue Interchange. Although there are other roadways that run parallel to I-195, such as School Street, Oakley Street and Freeborn Avenue, these roadways do not lend themselves to an upgrade alternative for the following reasons:

- School Street, Oakley Street and Freeborn Avenue serve residential areas. The addition of freeway-based traffic would alter the classification of these roadways and would adversely impact the surrounding neighborhoods that are currently served by these roadways.
- School Street, Oakley Street and Freeborn Avenue are narrow roadways. Widening would adversely impact the adjacent residential properties.
- The use of School Street, Oakley Street or Freeborn Avenue necessitates more turn maneuvers than the use of Warren Avenue.

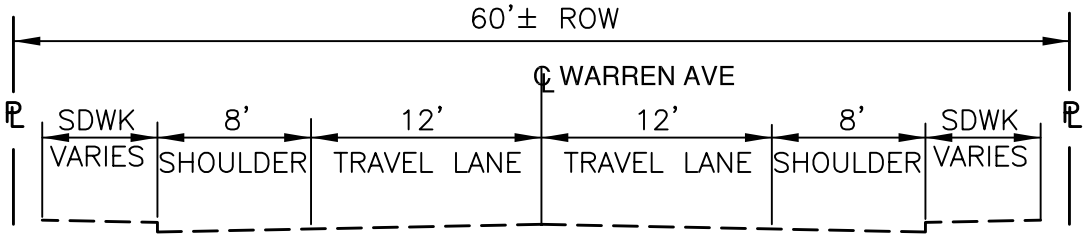
The logical Upgrade Alternative that would improve travel to and from the east is to widen Warren Avenue to three or four travel lanes between its westerly terminus at Valley Street (the area known as Watchemoket Square) and the I-195 eastbound on-ramp at So. County Street. This type of improvement would increase the capacity of the route to and from I-195 to the east. Warren Avenue is classified as a minor arterial highway. By definition, as provided by the RI Statewide Planning Program and the Federal Highway Administration, an arterial highway "emphasizes a high level of mobility for through movement" over the function of access to adjacent properties.

As described previously, Warren Avenue is 40 feet wide between Watchemoket Square and Broadway and 44 feet wide east of Broadway, containing one travel lane in each direction and parking on both sides of the roadway. The existing typical sections for Warren Avenue are shown on Figure 5.

A three-lane section was considered for Warren Avenue. The three-lane section could be accomplished within the 40-foot roadway width but would require the elimination of parking. The three-lane section would consist of one travel lane in each direction and a center dual left turn lane. The advantage of a three-lane section with a center turn lane is that vehicles turning left are removed from the mainstream of traffic. The left-turning traffic can wait in the center turn lane. A three-lane section is beneficial in areas where there are a lot of mid-block left turns.



FROM BROADWAY TO I-195 RAMPS



FROM VALLEY ST. TO BROADWAY

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

WARREN AVENUE

EXISTING
TYPICAL SECTIONS

SCALE: 1"=10'

FIGURE 5

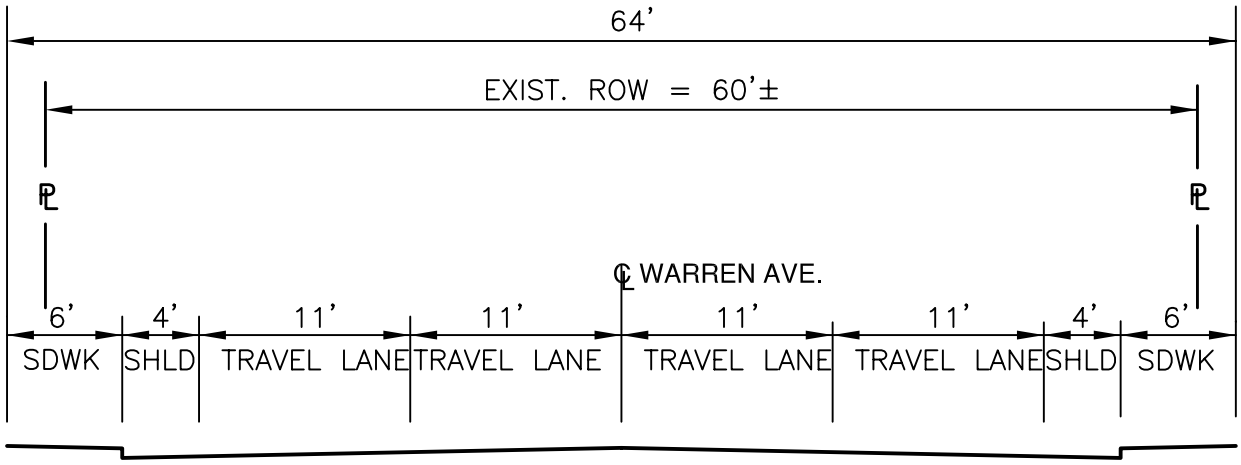
For example, three-lane sections are often beneficial on arterials with adjacent commercial development. In the case of Warren Avenue, much of the mid-block turning traffic consists of turns into and out of residential driveways. The volume of mid-block left turns is not high. The sacrifice of the existing on-street parking necessary to fit the three-lane section offsets the benefits of the center turn lane. For these reasons, the three-lane section on Warren Avenue was not pursued. Furthermore, a three-lane cross-section which includes two travel lanes in one direction and one travel lane in the opposite direction is also not practical due to the roadway width constraints and the elimination of on-street parking.

Figure 6 shows the typical section necessary to provide four lanes of travel on Warren Avenue. The section provides four 11-foot travel lanes, two 4-foot bicycle-tolerant shoulders, and 6-foot sidewalks on both sides of the road. That typical section comprises 64 feet. The existing right-of-way along Warren Avenue in the project area is between 55 and 60 feet wide, depending on exact location. As such, this type of arterial upgrade would require strip-taking along Warren Avenue.

The section of Warren Avenue from Watchemoket Square to Broadway includes parking on both sides of the roadway, which is highly utilized. A parking survey was conducted along Warren Avenue on four weekdays at varying times, in which the number of occupied spaces were counted. Between Watchemoket Square and Broadway, there are 196 on-street parking spaces. Observations indicated that percentage of occupied spaces consistently ranged between 20 and 36%. This portion of Warren Avenue has dense residential and commercial development in close proximity to the existing back of sidewalk. Elimination of parking in this area would produce hardships to the surrounding residents and businesses, many of which have little or no off-street parking. In addition, the strip taking that would be required for a roadway widening is estimated to affect 115 properties along Warren Avenue, from Watchemoket Square to Broadway, and require the acquisition of 38 buildings.

Given the severity of impacts, it was determined that an Upgrade Alternative which converts Warren Avenue to three or four travel lanes is neither prudent nor feasible. As a result, lesser improvements have been considered. In essence, therefore, the Upgrade Alternative for this project is actually a combination Upgrade/TSM improvement. Reference is made to Figure 7. The components of this alternative, from west to east, are as follows:

- **Warren Avenue/I-195 eastbound off-ramp.** This intersection will be signalized, and the signal will be coordinated with the proposed signal at Warren Avenue/Potter Street/Fourth Street. In this vicinity, Warren Avenue carries one travel lane in each



FROM BURGESS AVENUE TO I-195 RAMPS

Gordon R. Archibald, Inc.
Professional Engineers

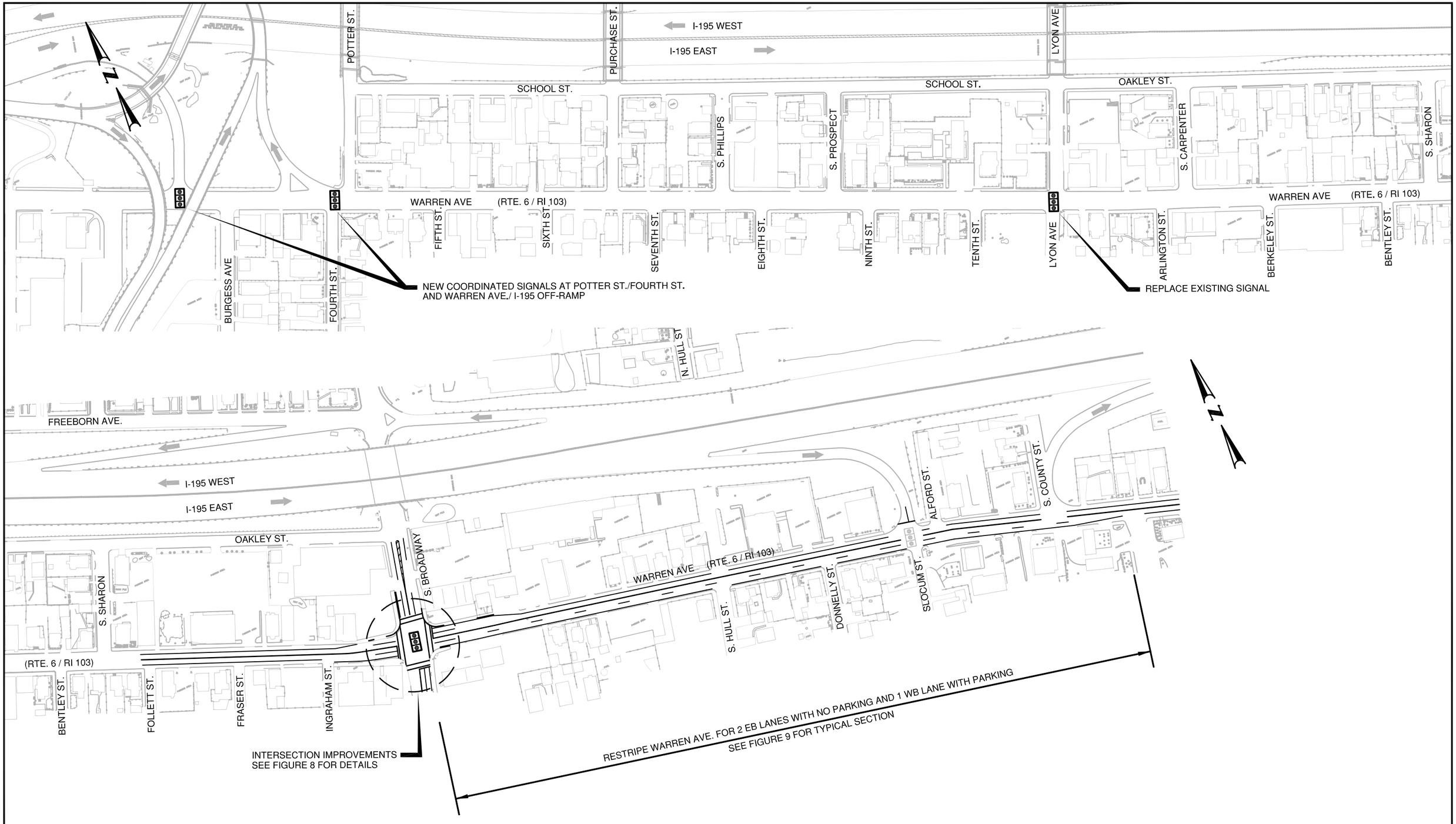
Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

WARREN AVENUE
4-LANE ALTERNATIVE

TYPICAL SECTION

SCALE: 1"=10'

FIGURE 6



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

UPGRADE / TSM ALTERNATIVE

SCALE 1"=200'

FIGURE 7

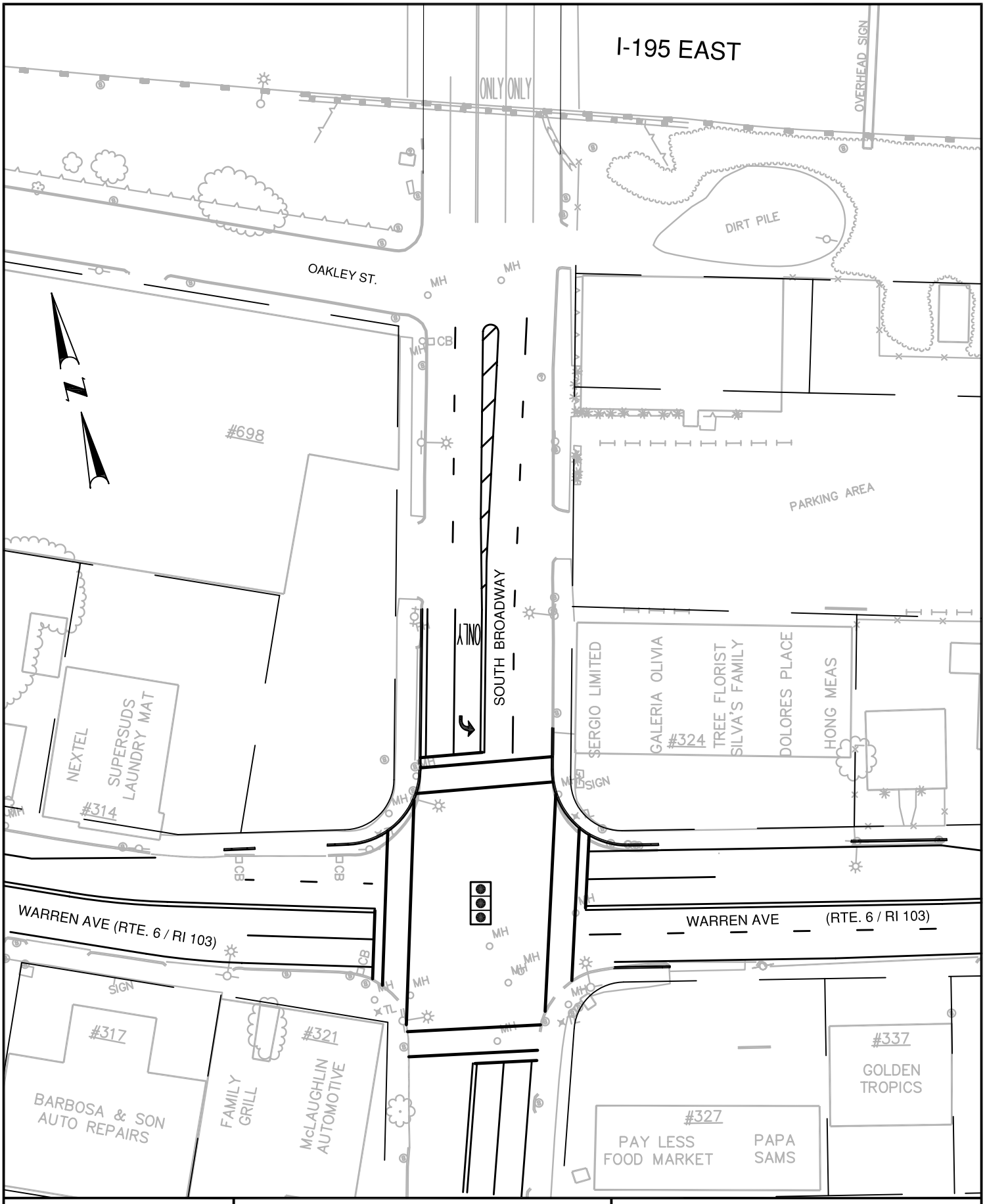
direction. As part of the Washington Bridge project, an eastbound left-turn lane is provided on Warren Avenue between Burgess Avenue and Fourth Street. These lane arrangements will be maintained with the Upgrade/TSM improvements.

- **Warren Avenue/Potter Street/Fourth Street.** This intersection will be signalized as part of the Upgrade/TSM alternative. The signal will operate with split phases for the offset side streets, each of which provides one travel lane in each direction. The signal will run in coordination with the signal at Warren Avenue/I-195 westbound off-ramp. The coordination of these two signals will also help traffic operations at the unsignalized intersection of Warren Avenue/I-195 westbound on-ramp, since the traffic signals will create gaps in the traffic to allow Warren Avenue traffic to turn left onto the westbound on-ramp.
- **Warren Avenue/Lyon Avenue.** The signal at this intersection will be replaced under the Upgrade/TSM alternative. The existing signal is old, and some of the signal heads are eight-inch signal heads. The new signal will have 12-inch signal heads and LED lenses, which will improve visibility. There is a high incidence of accidents at this location. The improved signal visibility is expected to reduce the occurrence of accidents.
- **Broadway/Warren Avenue.** Intersection improvements here will provide two lanes of traffic on each Warren Avenue approach, a two-lane northbound approach and an exclusive left-turn lane and a thru/right-turn lane on the southbound approach. See Figure 8.
- **Warren Avenue, between Broadway and So. County Street.** Re-stripe this section of roadway within the existing street width. The re-striping will provide an 8-foot parking lane and 12-foot travel lane in the westbound direction, and two 11-foot travel lanes and a 2-foot curb offset in the eastbound direction. The typical section is shown in Figure 9. While on-street parking is maintained on the north side of Warren Avenue, the re-striping eliminates on-street parking on the south side of Warren Avenue in this area. In addition, the concept of re-striping without widening the road would require a waiver of the usual bicycle-tolerant shoulder in the eastbound direction.

2.4 Build Alternatives

2.4.1 Development and Evaluation of Build Alternatives

After developing a thorough understanding of the existing conditions in the project area, developing constraint maps, and reviewing the traffic projections in the area, design of highway



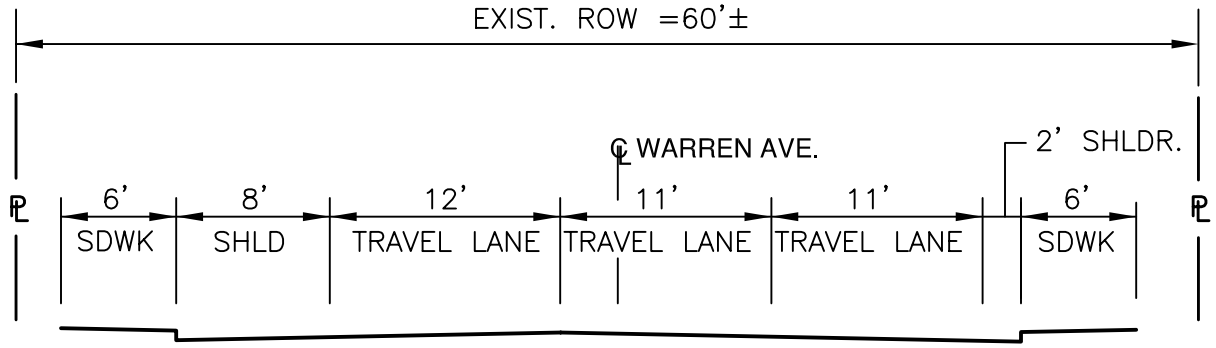
Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

UPGRADE / TSM ALTERNATIVE
WARREN AVE / BROADWAY
INTERSECTION IMPROVEMENTS

SCALE 1"=60'

FIGURE 8



FROM BROADWAY TO I-195 RAMPS

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

UPGRADE / TSM
ALTERNATIVE
WARREN AVENUE
TYPICAL SECTION

SCALE: 1"=10'

FIGURE 9

improvement alternatives was initiated. The initial intention was to consider every option at the preliminary stage in order to recognize both the opportunities and the constraints of the area. At a working session, the City of East Providence, the Rhode Island Department of Transportation and the design consultant brainstormed to identify potential build concepts. Input was obtained from various disciplines of civil engineering and planning as the group represented a range of perspectives. Also, previous transportation studies and concepts were considered during the initial round of preliminary alternatives. The preliminary concepts were developed based upon criteria contained in *A Policy on Geometric Design of Streets and Highways – 2004* and in *A Policy on Design Standards- Interstate System*, both of which are published by the American Association of State Highway and Transportation Officials.

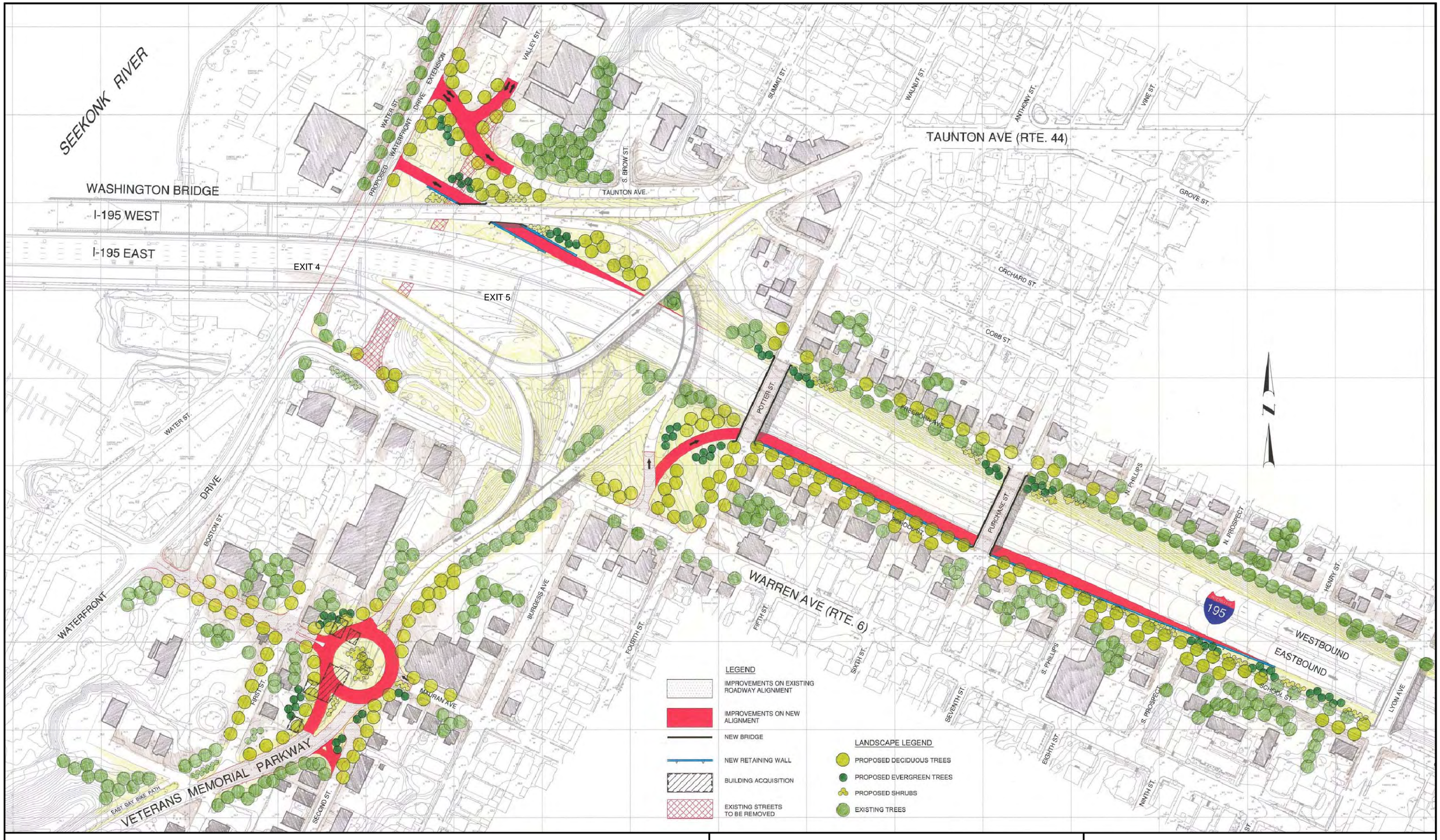
The initial efforts resulted in nine preliminary alternatives, which fell into three categories. Two of the initial nine alternatives involved connections between the freeway ramps and Waterfront Drive directly or Waterfront Drive via Warren Avenue. Two alternatives involved connections to Veterans Memorial Parkway. The remaining five alternatives involved freeway ramps that connected to Potter Street. The Potter Street alternatives included a roundabout at the intersection of Taunton Avenue and Walnut Street. Some of the Potter Street alternatives included widening of Potter Street itself to a boulevard type roadway, and some included components of the Veteran Memorial Parkway alternatives.

The nine preliminary alternatives were evaluated. The benefits of each were identified, as well as the associated impacts. A logical and thorough process of elimination was employed to select the favored alternatives for further study. The selection process was conducted as a team effort with input from the City of East Providence, the Rhode Island Department of Transportation, the Federal Highway Administration, and the design consultant.

Three of the nine preliminary alternatives were selected for further evaluation. These include the two alternatives with connections to Waterfront Drive and Warren Avenue, and one of the alternatives that provided connections to Veterans Memorial Parkway. The three build alternatives are described in the sections to follow.

2.4.2 Waterfront Drive 1

The build alternative referred to as Waterfront Drive 1 is shown in Figure 10. This alternative provides new ramps to and from I-195 to the east, with the eastbound on-ramp originating at Warren Avenue and the westbound off-ramp terminating at Waterfront Drive. This alternative also includes a roundabout at Veterans Memorial Parkway and Mauran Avenue



Gordon R. Archibald, Inc.
Professional Engineers

BRADFORD ASSOCIATES
LANDSCAPE ARCHITECTS
25 CREIGHTON ST., PROVIDENCE, RI, 02906- 1518
TEL (401) 521.6867 FAX (401) 454.8491

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

WATERFRONT DRIVE - 1

SCALE 1"=200'

FIGURE 10

to facilitate traffic movements in the vicinity of the interchange and to allow Veterans Memorial Parkway traffic to access the new interchange ramps. This improvement will allow traffic on Veterans Memorial Parkway to access the new ramps via Waterfront Drive, without having to travel through neighborhood streets. The roundabout would provide access to Mauran Avenue to the west of Veterans Memorial Parkway, but would not allow turns into Mauran Avenue to the east so as to prevent travel through that neighborhood.

An extension of Taunton Avenue is proposed and will run from the current terminus of Taunton Avenue at Valley Street westerly to the proposed Waterfront Drive. The proposed I-195 westbound off-ramp necessitates the closing of Valley Street between Warren Avenue and Taunton Avenue.

Intersection Improvements

As part of this alternative, intersection improvements have been developed for three intersections including Warren Avenue/Broadway, Warren Avenue/Potter Street/Fourth Street, and Warren Avenue/I-195 eastbound off-ramp at Exit 5. The intersection improvements are described below:

Warren Avenue/Broadway. At this intersection, minor widening of Warren Avenue is proposed in order to provide a four-lane section on Warren Avenue through the intersection. On either side of the intersection, Warren Avenue will taper back to its existing cross-section with two travel lanes.

Presently, the intersection has two-lane approaches on each leg, with one of the lanes serving as an exclusive right-turn lane. Under the proposed improvements, the northbound, eastbound and westbound approaches would be striped to allow two general thru lanes. Southbound, Broadway would be striped for an exclusive left-turn lane and a thru/right-turn lane. Signal timing and phasing would be optimized for the proposed lane arrangements and anticipated traffic volumes. The intersection concept is the same as that shown for the Upgrade/TSM alternative in Figure 8.

Warren Avenue/I-195 Eastbound Off-ramp. Proposed improvements at this location include the signalization of this intersection. The existing lane arrangement will be maintained. Currently, Warren Avenue has a one-lane approach in each direction at this intersection, and the I-195 eastbound off-ramp has a two-lane approach with an exclusive left-turn lane and an exclusive right-turn lane. The signal would be coordinated with the signal proposed at Warren

Avenue/Potter Street. The inclusion of these two coordinated signals will aid traffic operations at the unsignalized intersection of Warren Avenue/I-195 on-ramp, as the signals will create gaps in the Warren Avenue traffic stream that will allow motorists to turn left into the I-195 eastbound/westbound on-ramp.

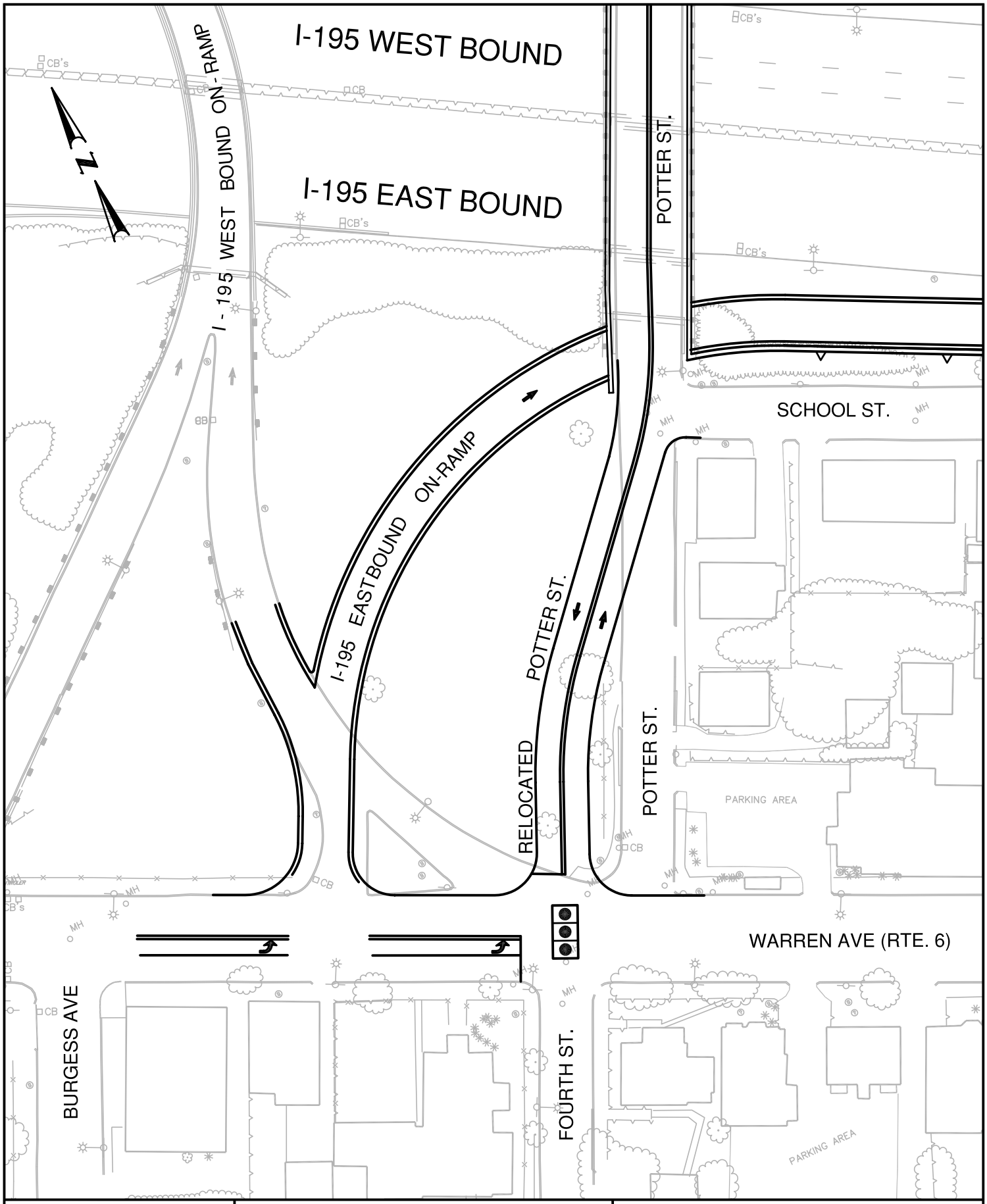
Warren Avenue/Potter Street/Fourth Street. Proposed improvements at the Warren Avenue/Potter Street/Fourth Street intersection include signalization of the intersection. Under the Washington Bridge project, a portion of Warren Avenue was re-striped to provide an eastbound exclusive left-turn lane at Potter Street and at the I-195 on-ramp. The Potter Street Bridge must be replaced under the Waterfront Drive 1 alternative, and this feature provides the opportunity to realign the southern portion of Potter Street to intersect Warren Avenue opposite of Fourth Street to form a conventional four-legged intersection. The newly aligned intersection will be signalized. Refer to Figure 11.

I-195 Eastbound On-Ramp

This alternative includes an I-195 eastbound on-ramp that begins at Warren Avenue west of Potter Street. Initially, the ramp shares common alignment with the I-195 westbound on-ramp for approximately 75 feet. The two ramps then diverge, with the new I-195 eastbound on-ramp curving easterly, proceeding under the Potter Street Bridge, descending in elevation, proceeding under the Purchase Street Bridge, and merging with I-195 eastbound between Purchase Street and Lyon Avenue. Retaining walls will be required along the ramp. The proposed ramp is 24 feet wide, providing a 20-foot travel lane and two 2-foot offsets. Refer to Figure 12 for a typical section of this alternative.

To construct this ramp, the Potter Street Bridge No. 467 and the Purchase Street Bridge No. 468 will require replacement to lengthen the bridge span. These bridges are rigid-frame concrete type bridges and were constructed in 1959. Based upon an inspection conducted in 2003, Potter Street Bridge No. 467 had a structural evaluation of 4.0, which is indicative of poor condition. The Purchase Street Bridge No. 468 had a structural evaluation of 6.0, which indicates that the bridge is in satisfactory condition.

In addition to the bridge replacements, construction of the I-195 eastbound on-ramp will require that a retaining wall be constructed along the south side of the ramp. The retaining wall varies in height depending on the location and the change in grade and at some points is as high as 20 feet.



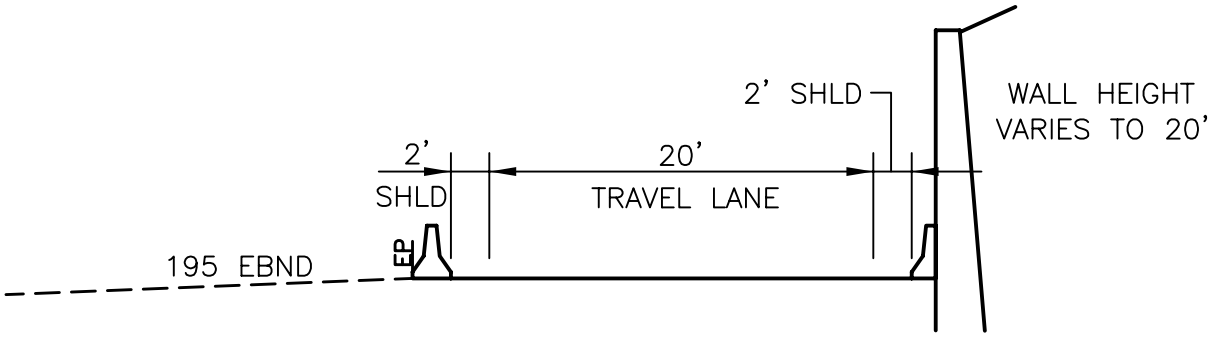
Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

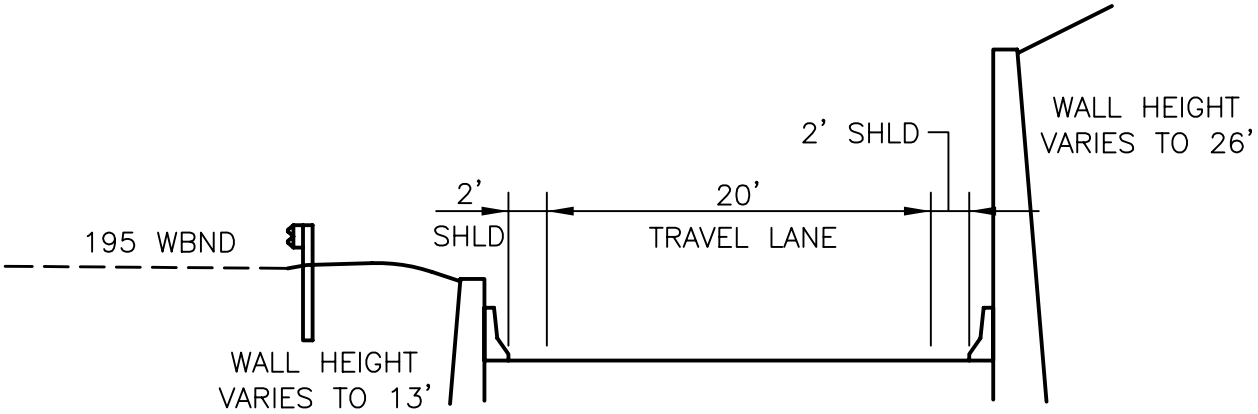
WATERFRONT DRIVE 1 & 2
WARREN AVE. / POTTER ST. / FOURTH ST.
INTERSECTION IMPROVEMENTS

SCALE 1"=60'

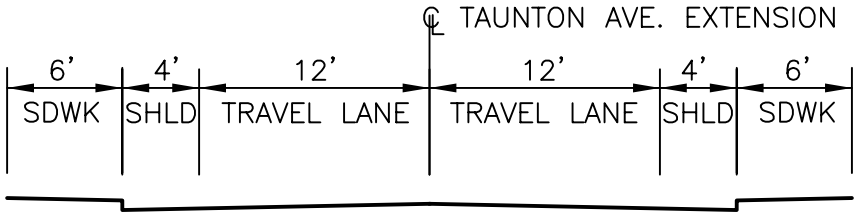
FIGURE 11



I-195 EAST BOUND ON - RAMP



I-195 WEST BOUND OFF - RAMP



TAUNTON AVENUE EXTENSION

VALLEY ST. TO WATERFRONT DR. EXTENSION

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

WATERFRONT DRIVE
ALTERNATIVES 1 & 2

TYPICAL SECTIONS

SCALE 1"=10'

FIGURE 12

I-195 Westbound Off-Ramp

Under the Waterfront Drive 1 alternative, a new ramp is proposed to carry traffic from I-195 westbound to Waterfront Drive. The typical section of the ramp is the same as described for the proposed eastbound on-ramp. That ramp would begin to the west of the Potter Street overpass, descend westerly, pass under the existing Taunton Avenue westbound on-ramp via a new bridge, and terminate in a new T-intersection at Waterfront Drive. The proposed ramp is fairly short and just meets the highway design criteria in terms of the recommended length for deceleration. The ramp begins on I-195 on the outside of a horizontal curve, with the ramp having the straight path and the freeway containing the curve. As such, adequate pavement markings and signage will be necessary to delineate the freeway path as the predominant travel path.

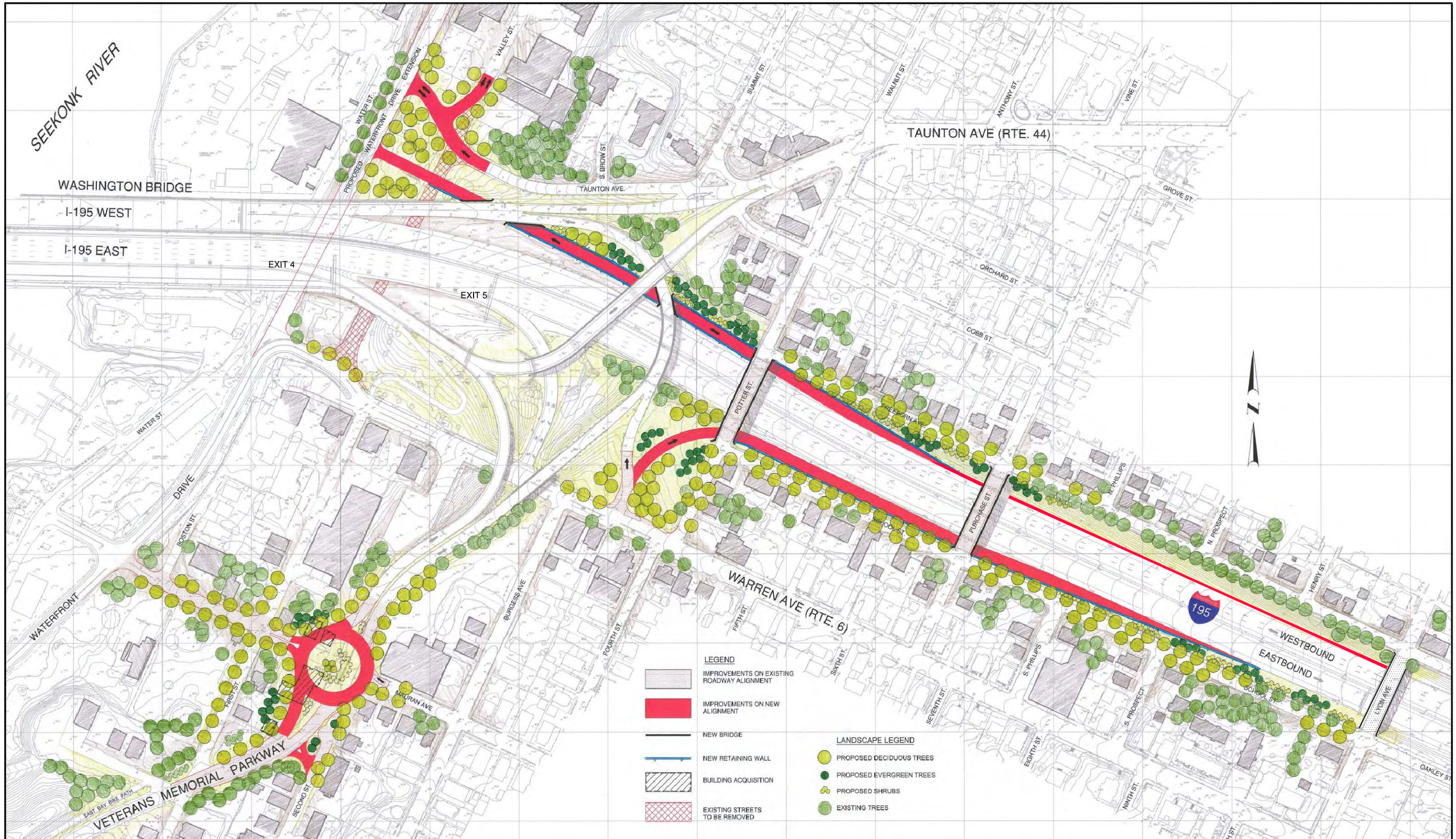
As previously described, this ramp terminates at Waterfront Drive. Construction of the extension of the lower end of Warren Avenue and the southernmost section of Waterfront Drive was begun by RIDOT in 2006. Design is underway for the section of Waterfront Drive from Warren Avenue northerly to Dexter Road, with construction to follow in the near future.

2.4.3 Waterfront Drive 2

The option referred to as Waterfront Drive 2 follows the same overall concept as Waterfront Drive 1. The only difference between the two alternatives is in the new westbound off-ramp to Waterfront Drive. Under Waterfront Drive 2, the westbound off-ramp is longer than under the previous option, providing a superior alignment with greater distance for vehicle deceleration. This ramp would begin just to the west of Purchase Street, passing under Potter Street, under the I-195 westbound on-ramp from Veterans Memorial Parkway (via an extended bridge), under the new bridge that carries I-195 eastbound off-ramp traffic to Taunton Avenue, under the Taunton Avenue westbound on-ramp (via a new bridge), and terminate at Waterfront Drive. A full replacement of the Potter Street, Purchase Street and Lyon Avenue bridges would be required for this alternative. Also, an auxiliary lane would necessary along I-195 westbound between the existing on-ramp from Broadway and the newly proposed off-ramp to Waterfront Drive. All other features are the same as previously described for Waterfront Drive 1, including the relocation and extension of the lower section of Taunton Avenue, the elimination of the short section of Valley Street between Warren Avenue and Taunton Avenue, the new eastbound on-ramp from Warren Avenue, and the roundabout at Veterans Memorial Parkway and Mauran Avenue. Retaining walls will be necessary along the new ramp.

The Waterfront Drive 2 alternative is shown in Figure 13. The typical sections for the proposed ramps under this alternative are the same as Waterfront Drive 1 and are shown in Figure 12.

The intersection improvements at Warren Avenue/Broadway and Warren Avenue/I-195 eastbound off-ramp, as described under Waterfront Drive 1, will also be included in the Waterfront Drive 2 alternative. Likewise, the intersection improvements at Warren Avenue/Potter Street/Fourth Street will be as described for Waterfront Drive 1 and will include signalization and the realignment of the southern portion of Potter Street.



Gordon R. Archibald, Inc.
Professional Engineers

BRADFORD ASSOCIATES
LANDSCAPE ARCHITECTS
25 CREIGHTON ST., PROVIDENCE, RI, 02906- 1518
TEL (401) 521.6867 FAX (401) 454.8491

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

WATERFRONT DRIVE - 2

SCALE 1"=200'

FIGURE 13

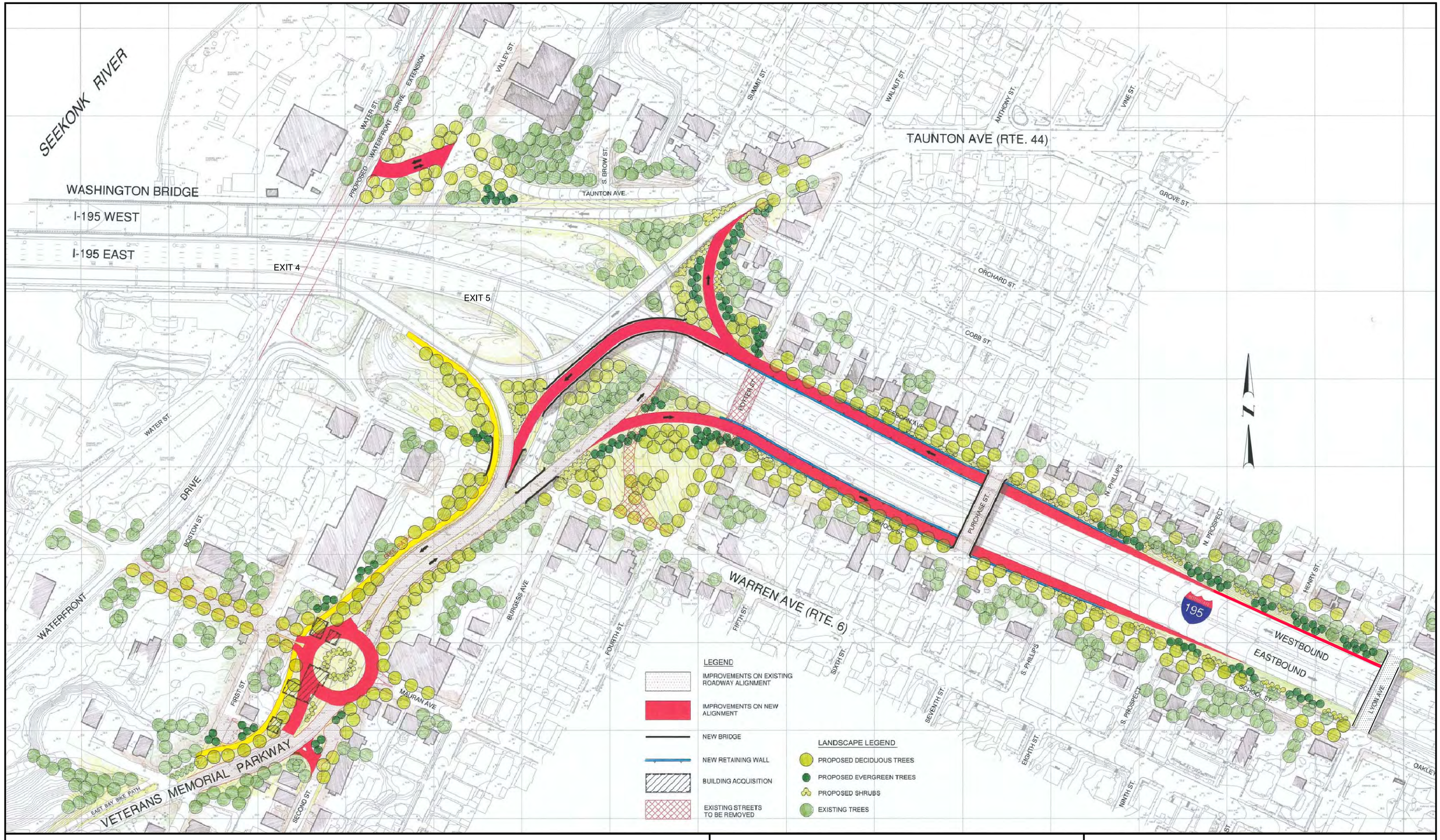
2.4.4 Veterans Memorial Parkway 1

The third build alternative, referred to as Veterans Memorial Parkway 1, contains a different concept in that the new ramps to and from the east on I-195 would connect to Veterans Memorial Parkway. Figure 14 shows the plan for this alternative, and Figure 15 shows the typical sections. (This option is referred to as Veterans Memorial Parkway 1 because the initial nine alternatives also contained a Veterans Memorial Parkway 2. However, since only Veterans Memorial Parkway 1 was among the three preliminary alternatives selected for further evaluation in this Environmental Assessment, it is heretofore referred to simply as the Veterans Memorial Parkway alternative.)

On I-195 westbound, a new off-ramp would begin to the west of Lyon Avenue, pass under Purchase Street and through Potter Street, and then turn southerly, passing over I-195 and Warren Avenue, merging with Veterans Memorial Parkway southbound. The ramp has a north-south split just beyond Potter Street. The south branch of the ramp will connect to Veterans Memorial Parkway, and the north branch of the ramp will connect to Taunton Avenue. Because of the grades of this ramp, the existing Potter Street Bridge would have to be removed, thereby disconnecting Potter Street between School Street and Freeborn Avenue. This ramp would require replacement of the Purchase Street and Lyon Avenue bridges and the construction of new bridges over I-195 and Warren Avenue.

For access to eastbound I-195, a new on-ramp would be provided. Initially, the ramp will coincide with the Veterans Memorial Parkway northbound on-ramp to I-195 westbound. Upon crossing Warren Avenue, the new ramp branches off to the east, through Potter Street, under Purchase Street and merges with I-195 eastbound between Purchase Street and Lyon Avenue. This ramp requires the removal of the existing Warren Avenue on-ramp to I-195 westbound. Also, the bridge that carries Veterans Memorial Parkway northbound over Warren Avenue would have to be replaced.

A roundabout is again being considered at Veterans Memorial Parkway and Mauran Avenue. The roundabout is the same as that included in other alternatives, except that access is provided to Mauran Avenue both east and west of Veterans Memorial Parkway. An extension of the bike path is proposed to run along Veterans Memorial Parkway from the I-195 eastbound off-ramp to the bike path south of the proposed roundabout. Since the Veterans Memorial Parkway alternative requires the replacement of Bridge No. 464, which carries the I-195 eastbound off-ramp over Warren Avenue, this alternative lends itself well to the extension of the bike path. Under this concept, the bike path will be carried over Warren Avenue on the new Bridge No. 464



Gordon R. Archibald, Inc.
Professional Engineers

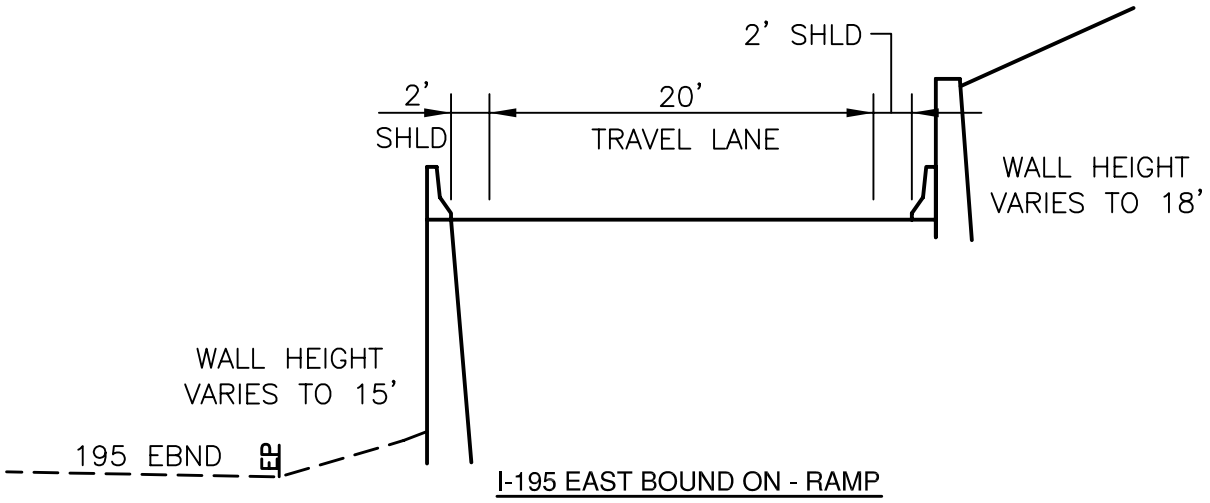
BRADFORD ASSOCIATES
LANDSCAPE ARCHITECTS
25 CREIGHTON ST., PROVIDENCE, RI, 02906-1518
TEL (401) 521.6867 FAX (401) 454.8491

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

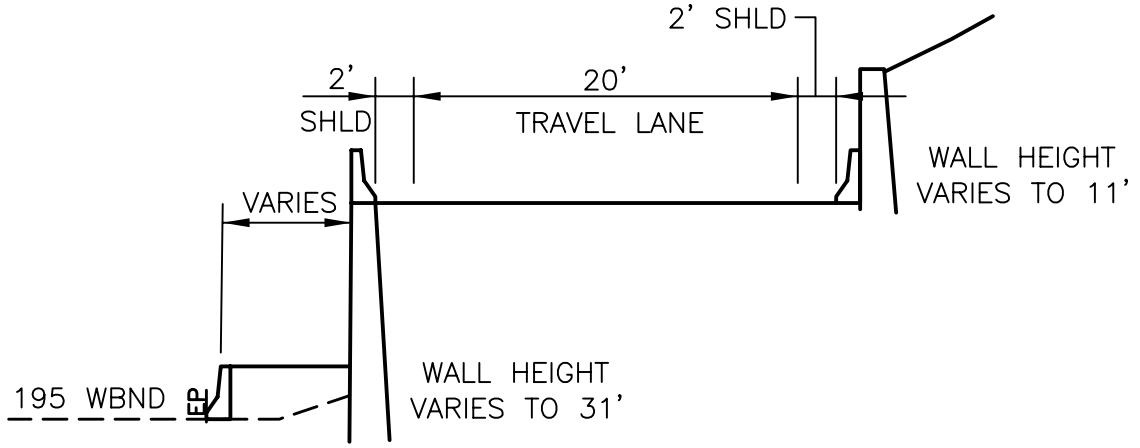
VETERANS MEMORIAL PARKWAY - 1

SCALE 1"=200'

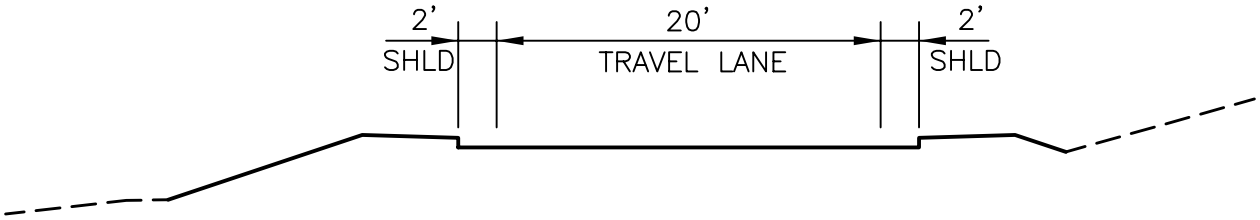
FIGURE 14



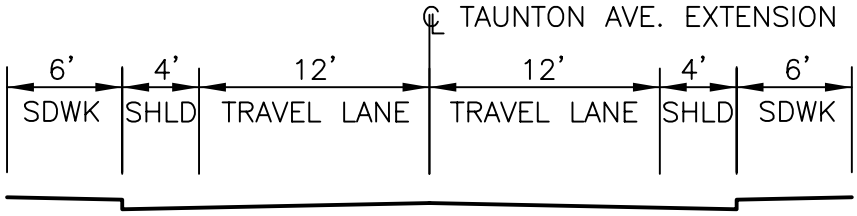
I-195 EAST BOUND ON - RAMP



I-195 WEST BOUND OFF - RAMP

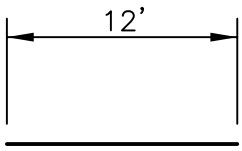


I-195 WEST BOUND OFF - RAMP TO TAUNTON AVENUE



TAUNTON AVENUE EXTENSION

VALLEY ST. TO WATERFRONT DR. EXTENSION



BIKE PATH

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

VETERANS MEMORIAL PARKWAY

TYPICAL SECTIONS

SCALE 1"=10'

FIGURE 15

and run parallel to Veterans memorial Parkway, beyond the roundabout to connect to the exclusive East Bay Bike Path in the vicinity of First Street. The extension of the bike path was not included in the Waterfront Drive build alternatives because those alternatives do not require the replacement of Bridge No. 464, and the bike path extension cannot be achieved without alterations to Bridge No. 464.

In addition, the proposed improvements at the Warren Avenue/Broadway intersection will be included in the Veterans Memorial Parkway alternative. The proposed improvements are as described under the Waterfront Drive 1 alternative.

2.5 Preferred Alternative

The preferred alternative is Waterfront Drive 2. This alternative contains a simple design concept that provides ramp alignments consistent with AASHTO design criteria, without the need for design exceptions. The entrance and exit points of the new ramps intersect with Warren Avenue and Waterfront Drive, respectively, thereby connecting to logical and convenient routes to the surrounding destinations. The extension of Taunton Avenue and the proposed roundabout at Veterans Memorial Parkway provide benefits to the surrounding street circulation. The roundabout serves as a gateway and provides a visual cue to motorists that the highway ramp has ended and the local roadway has begun. The project lends well to staged-construction, which is a positive attribute when funding a large-scale project such as this. The design of the proposed westbound off-ramp under this option is superior to that of Waterfront Drive 1 in that the length of the ramp allows for the stacking of queued vehicles at the ramp terminus without having any effect on the deceleration length. Under this alternative, the required deceleration length for westbound off-ramp traffic is provided on the auxiliary lane prior to the ramp proper.

Waterfront Drive 1 was not selected as the preferred alternative primarily due to the proposed geometry of the I-195 westbound off-ramp. Under this alternative, the ramp proper must be utilized as part of the deceleration distance required for westbound off-ramp traffic. The ramp is only approximately 600 feet in length, and, although it meets the design criteria for deceleration length, stacking of queued vehicles at the ramp terminus is a concern. Also of concern is the fact that the ramp begins on the outside of a horizontal curve on I-195. The ramp could be perceived as the straight-ahead path by motorists traveling westbound on I-195. Waterfront Drive 1 and 2 draw the same amount of traffic to the new ramps and are similar in terms of socio-economic impacts. Waterfront Drive 1 is less costly than Waterfront Drive 2, but the design is less desirable from an engineering viewpoint than Waterfront Drive 2, because the latter option offers a superior alignment for the new I-195 westbound off-ramp.

Veterans Memorial Parkway was not selected as the preferred alternative because it is not as effective in terms of traffic operations and is more costly than the other build alternatives. Furthermore, based upon feedback at the public workshop, the off-ramp to Taunton Avenue was controversial, because it feeds traffic to an already congested area.

3.0 TRAFFIC ANALYSIS

3.1 Existing Traffic Volumes

Existing traffic conditions were established by compiling available traffic count data and collecting additional count data, where necessary. A traffic count program was implemented for this project. The count program involved the collection of automatic traffic recordings (ATR) and manual turning movement counts (MTMC). See Figure 16 for the count locations.

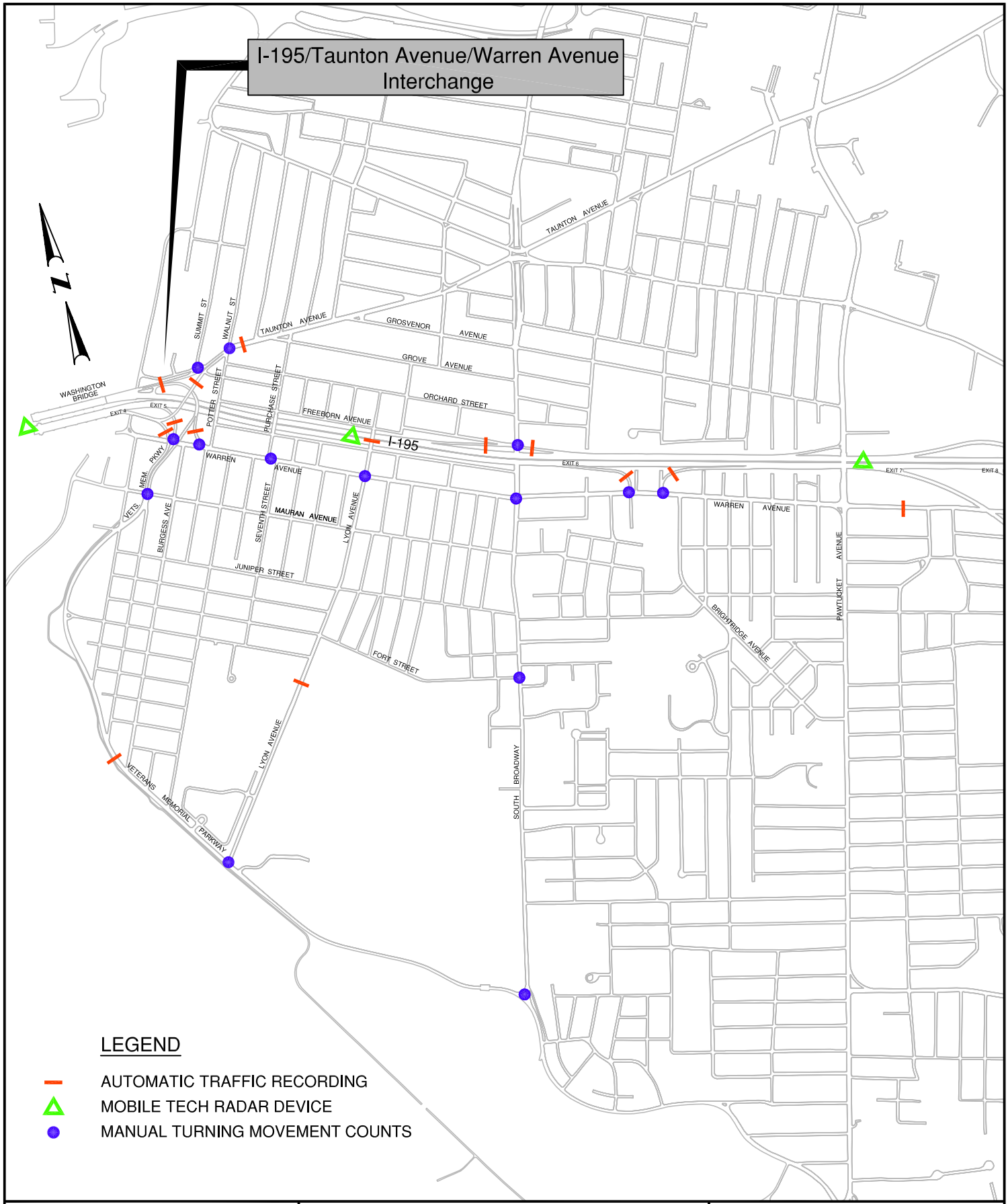
The traffic data collected in the ATR counts was expanded to determine the Average Annual Daily Traffic (AADT) volumes for the study area. The AADT volumes were estimated utilizing the 2000 Traffic Program Expansion Factors developed by the RIDOT Traffic Management Section. AADT volumes for the 2004 existing conditions are shown in Figure 17 and 18, with Figure 17 displaying the freeway volumes and Figure 18 showing the intersection volumes.

Peak hour traffic volumes were identified along the freeway and at the major intersections for two peak conditions, including the weekday AM peak hour and PM peak hour. The peak hour volumes were taken from the ATRs and the MTMCs. Graphics displaying the peak hour traffic volumes are included in Technical Memorandum No. 1, Traffic Projections and Analysis.

3.2 Projected Traffic Volumes

Traffic projections were developed utilizing a traffic model created for the study area. The traffic model is based upon the statewide traffic model maintained by the Rhode Island Statewide Planning Program. The statewide traffic model was reduced and compressed to represent the zones in and adjacent to the project study area. The model applies the regional growth rates of the statewide model to project the background traffic growth in the area.

The City of East Providence has specific plans to develop and revitalize the waterfront area along the Seekonk and Providence Rivers. The anticipated waterfront development is over and above the background growth of the area. As such, traffic projections have been estimated for the Waterfront Special Development District. These projections were utilized in the traffic model as “special generators.”

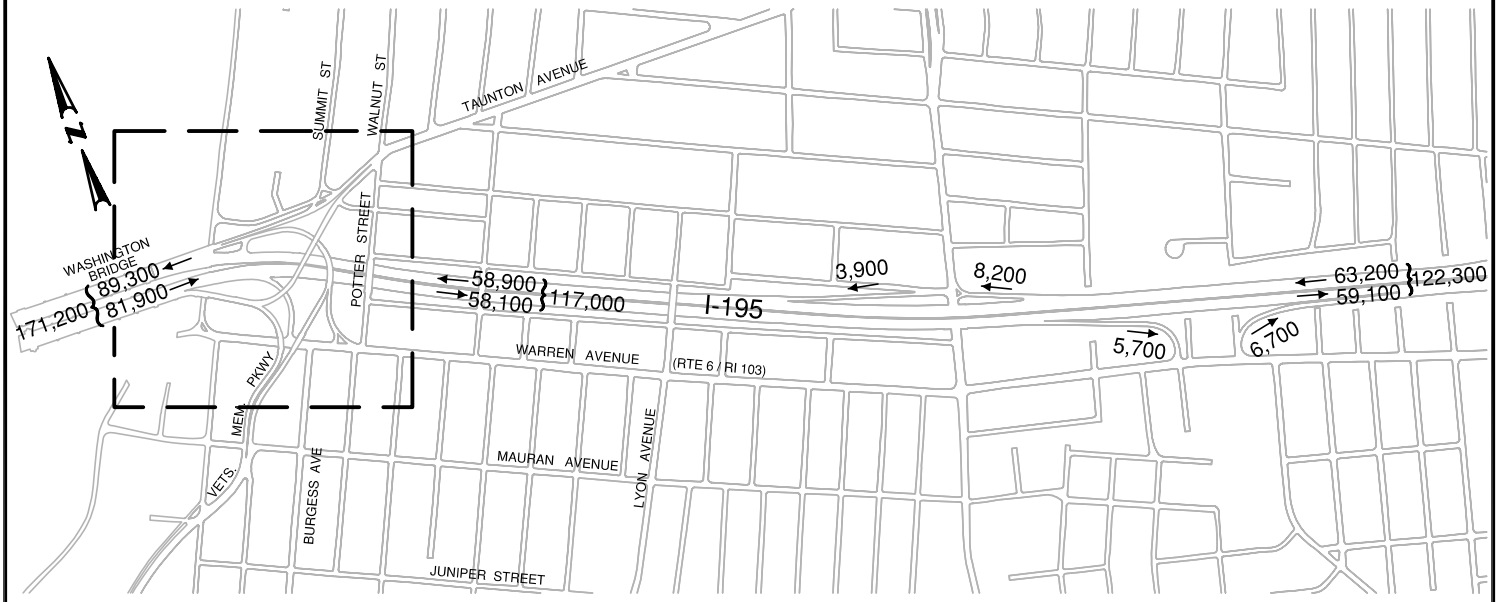


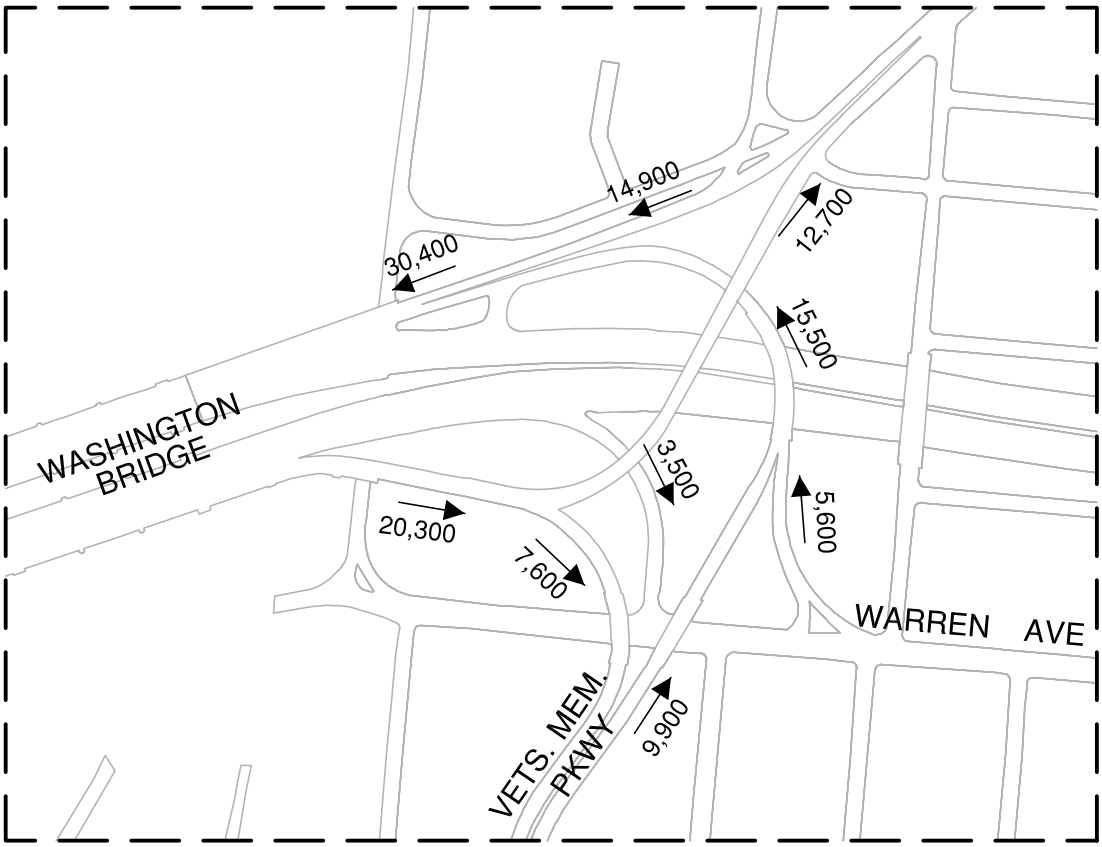
Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

TRAFFIC COUNT LOCATIONS

FIGURE 16





Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2004
AVERAGE ANNUAL
DAILY TRAFFIC
(AADT)
FREEWAY VOLUMES

FIGURE 17

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2004
AVERAGE ANNUAL
DAILY TRAFFIC
(AADT)
INTERSECTION VOLUMES

FIGURE 18

To project the traffic expected to be generated by the Waterfront District, urban planners reviewed the "East Providence Waterfront Special Development District Plan," commonly referred to as the "Waterfront District Plan," and determined reasonable estimates of development for the project forecast year of 2030. This information was used to estimate the trip generation associated with the waterfront development.

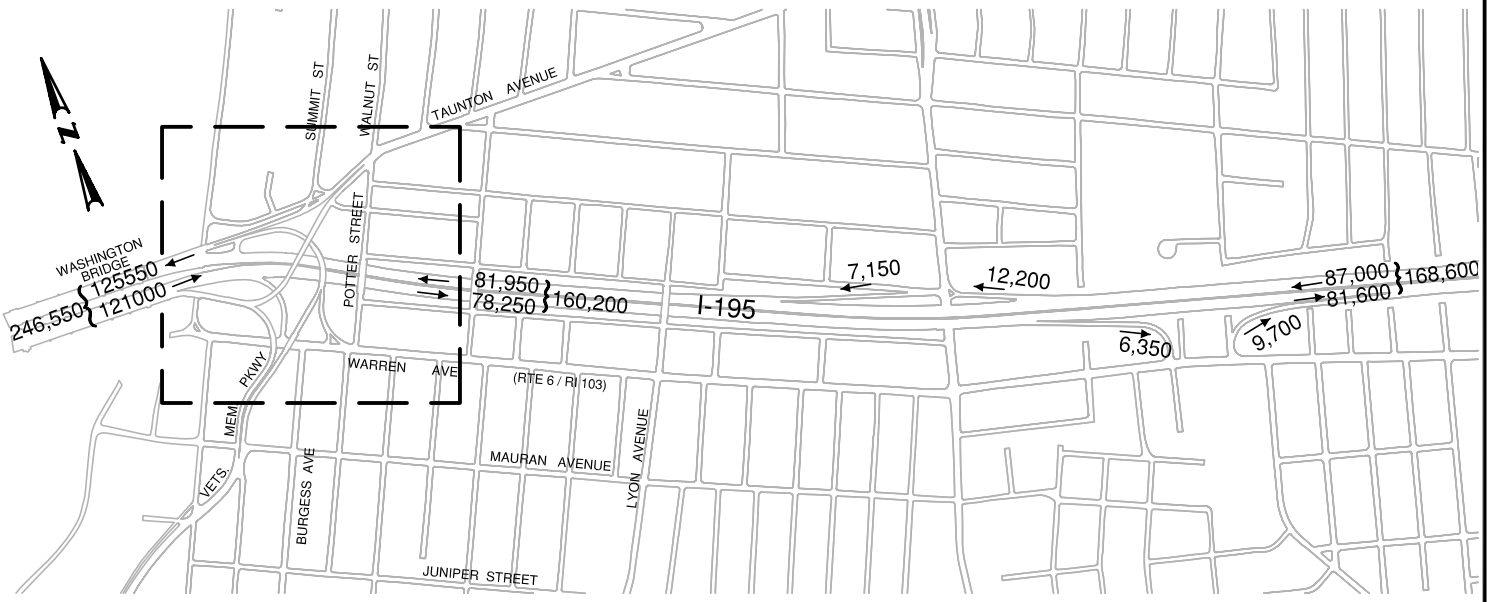
The study area was broken out of the statewide traffic model while maintaining the effects of regional growth, the model was calibrated, and the waterfront development was included in the modeling efforts as special generators. The model was used to develop traffic assignments for the project alternatives for the weekday daily traffic and the AM and PM peak hour conditions. Additional details regarding the traffic projections are available in Technical Memorandum No. 1, Traffic Projections and Analysis.

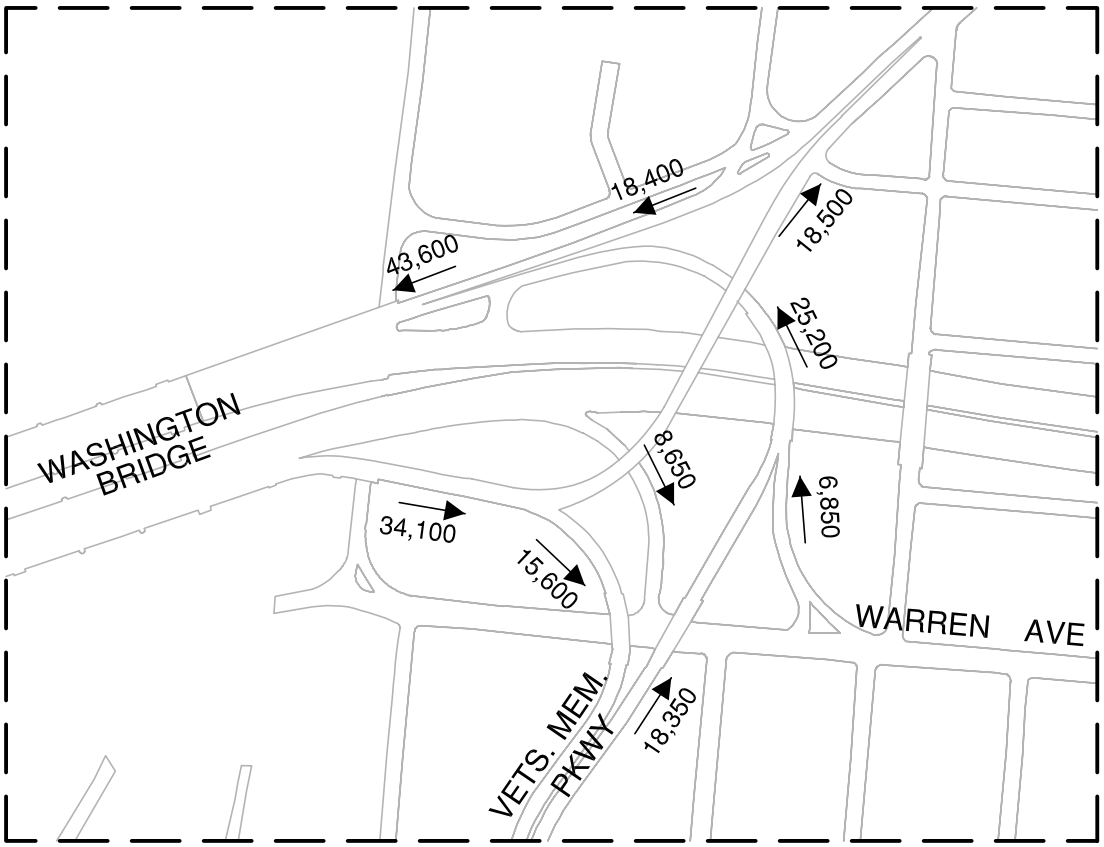
Figures 19 through 24 show the Average Annual Daily Traffic assignments for 2030 under the No-build alternative, Waterfront Drive 1 & 2 alternatives, and the Veterans Memorial Parkway 1 alternative. Note that traffic assignments are the same for Waterfront Drive 1 and Waterfront Drive 2 as these alternatives differ only in terms of the design of the proposed I-195 westbound off-ramp to Waterfront Drive. The peak hour traffic assignments for the 2030 No-build and build alternatives are included in Technical Memorandum No 1.

The 2004 existing traffic volumes were compared to the 2030 No-build traffic volumes. The freeway traffic volumes are projected to increase by 37-44 percent, which represents a growth rate of approximately 1.4% per year. In the last fourteen years, I-195 has grown by over 1% per year. The ramps at the project interchange are projected to increase in volume by approximately 53 percent.

Traffic assignments for the build alternatives were compared and are summarized in Table 1. The Waterfront Drive alternatives result in 8400 vehicles per day (vpd) on the new ramps, with 6150 vpd on the proposed I-195 eastbound on-ramp and 2250 vpd on the proposed I-195 westbound off-ramp. The Veterans Memorial Parkway alternative results in less volume on the new ramps, with 6450 vpd, consisting of 3600 vpd on the proposed I-195 eastbound on-ramp and 2850 vpd on the proposed I-195 westbound off-ramp.

The build traffic assignments were also compared in terms of the relief provided to Warren Avenue, which is the current route to and from I-195 to the east. Veterans Memorial Parkway reduces traffic along Warren Avenue by an average of 3000 vpd. The Waterfront Drive alternatives reduce the Warren Avenue traffic by an average of 1700 vpd. While the Waterfront



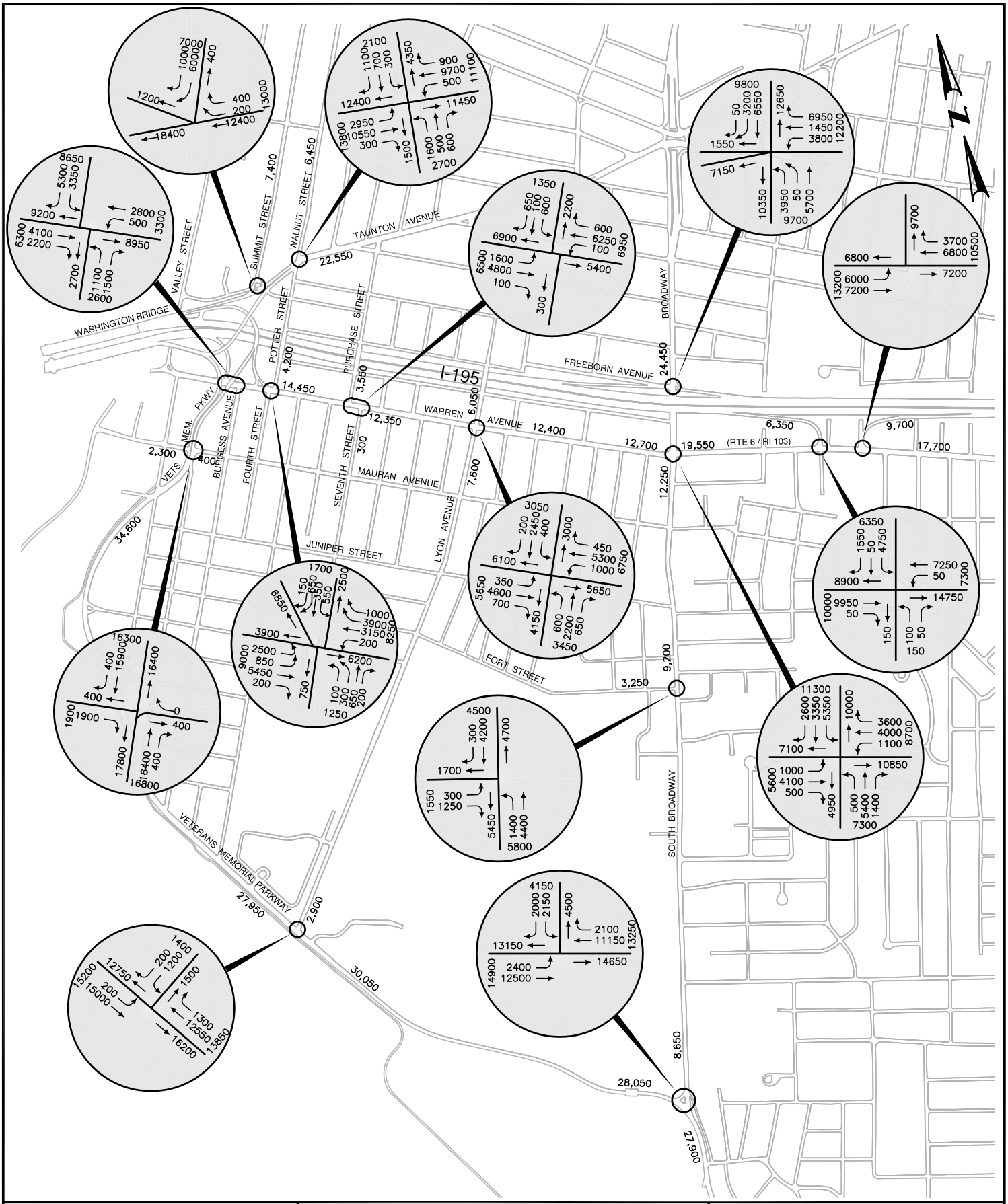


Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2030 NO BUILD
AVERAGE ANNUAL
DAILY TRAFFIC
(AADT)
FREEWAY VOLUMES

FIGURE 19



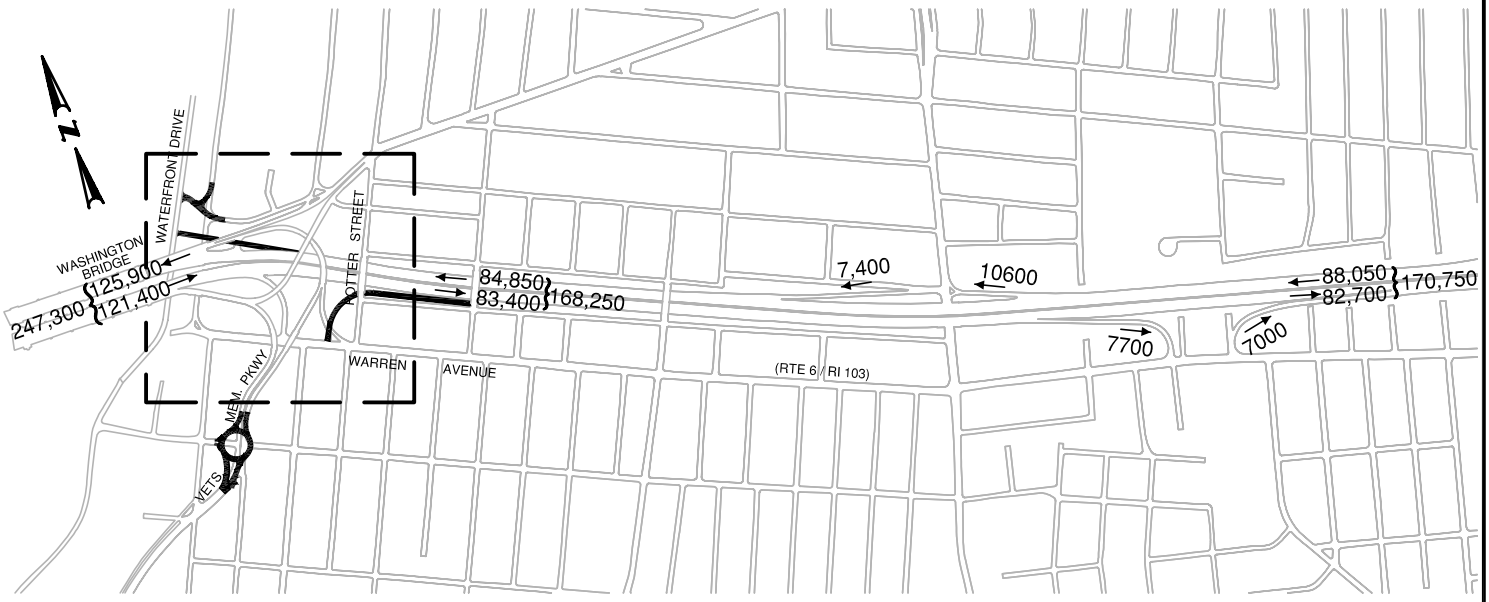
Gordon R. Archibald, Inc.
Professional Engineers

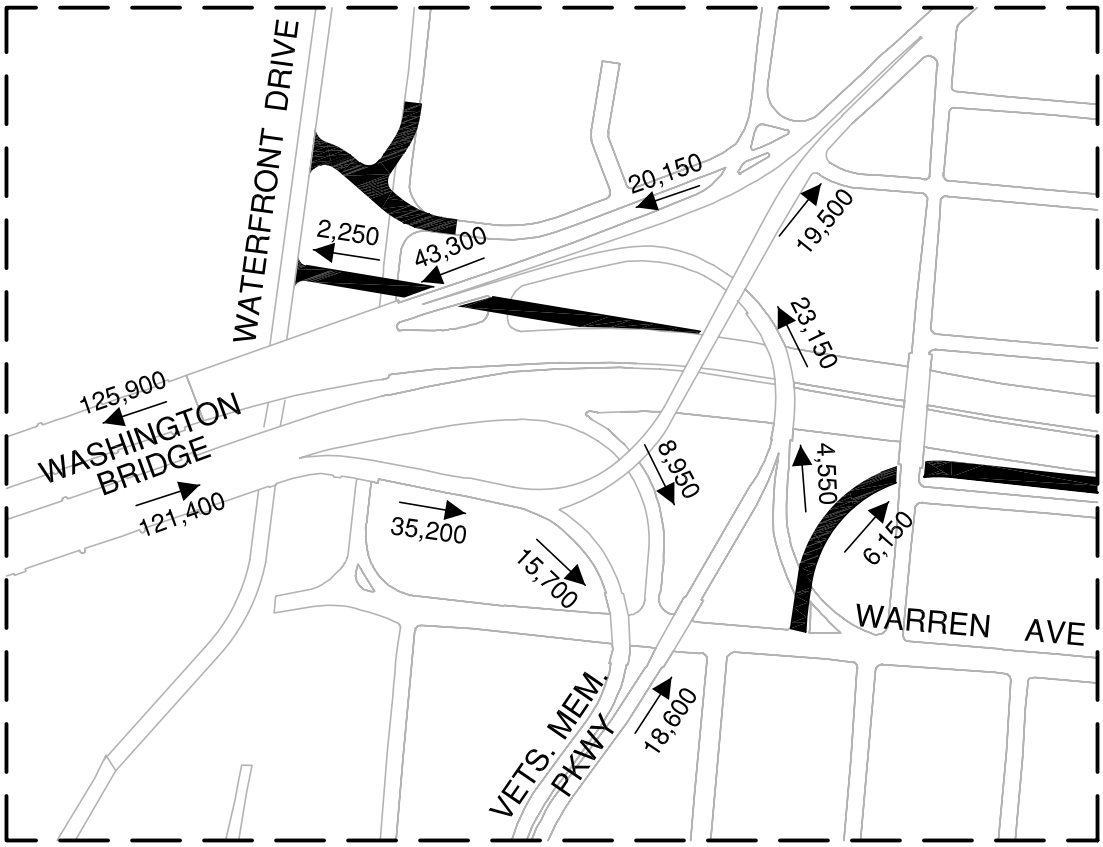
Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2030 NO BUILD AVERAGE ANNUAL DAILY TRAFFIC (AADT)

INTERSECTION VOLUMES

FIGURE 20



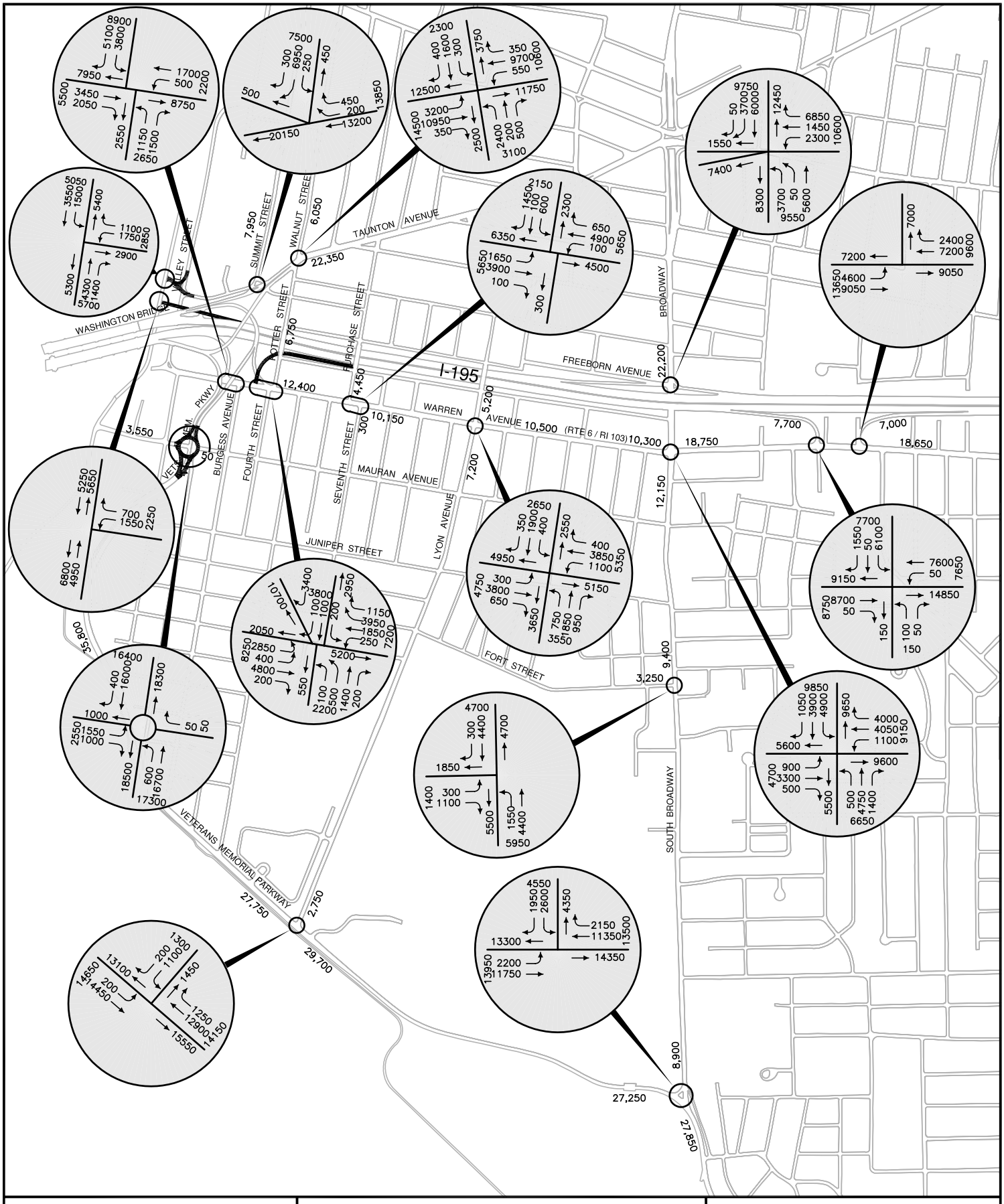


Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2030 BUILD
WATERFRONT DRIVE 1 & 2
AADT
FREEWAY VOLUMES

FIGURE 21

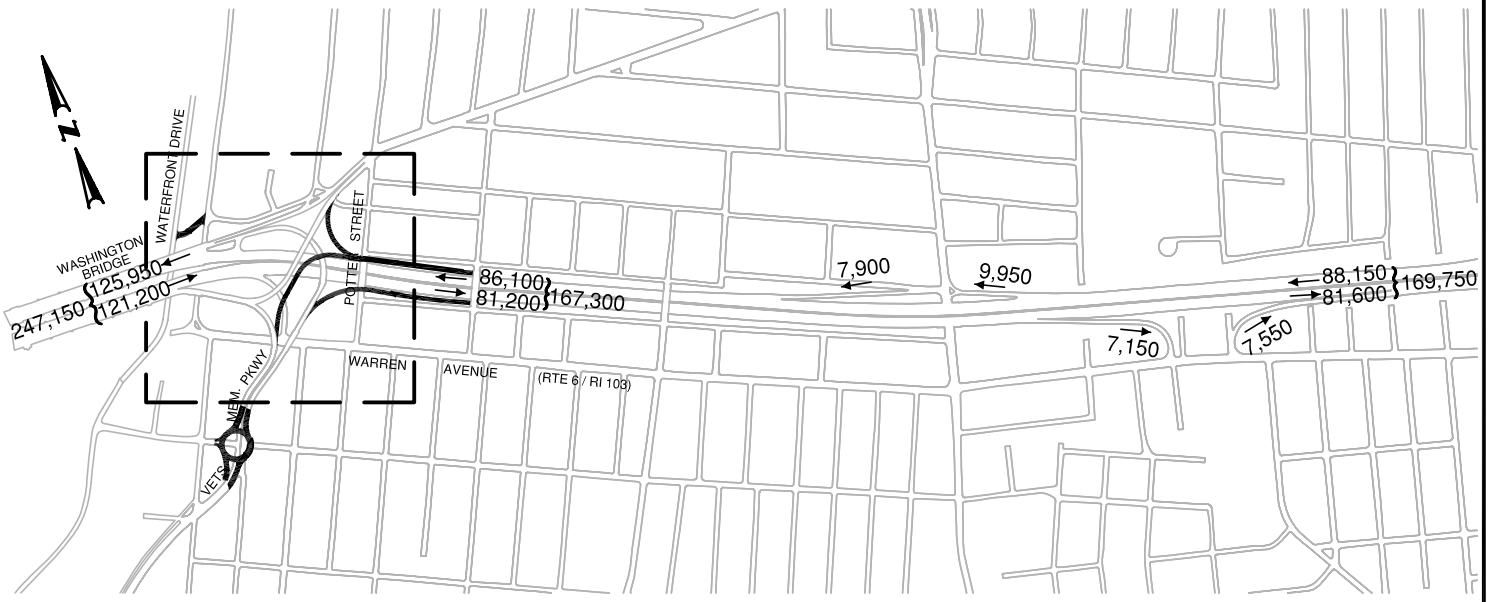


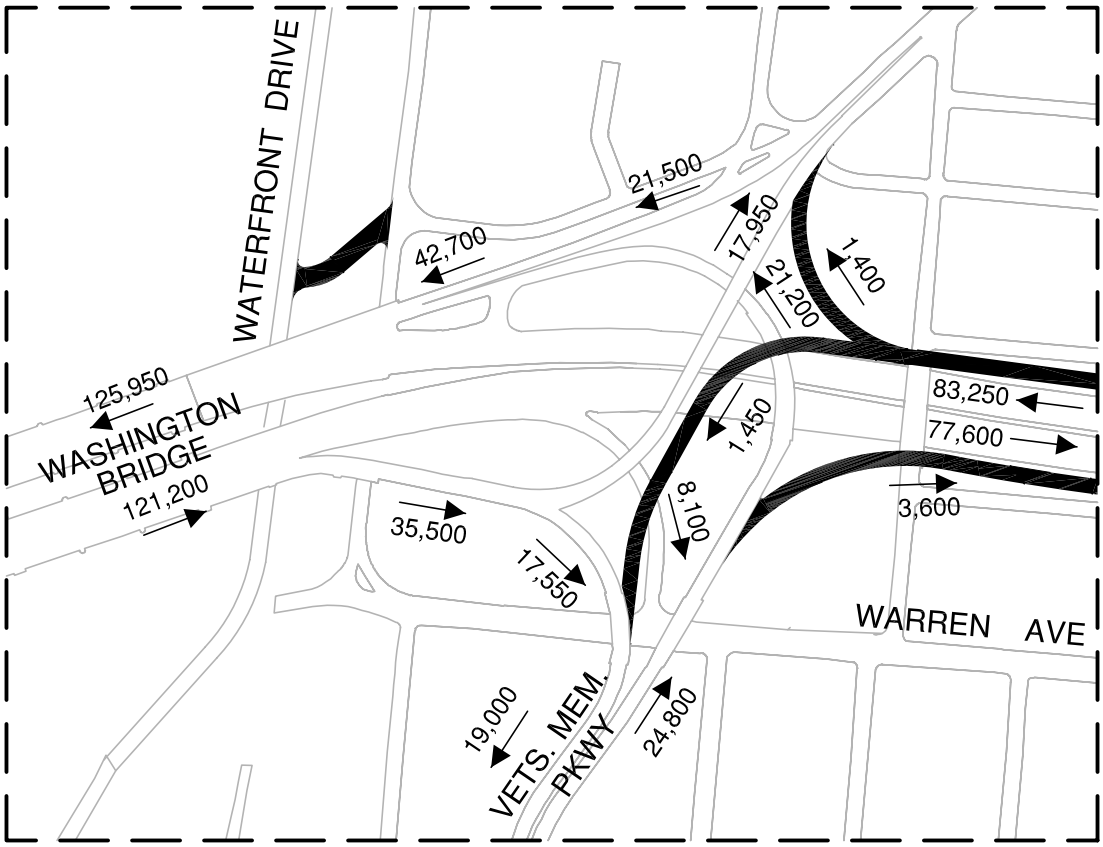
Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2030 BUILD
WATERFRONT DRIVE 1 & 2
AADT
INTERSECTION VOLUMES

FIGURE 22



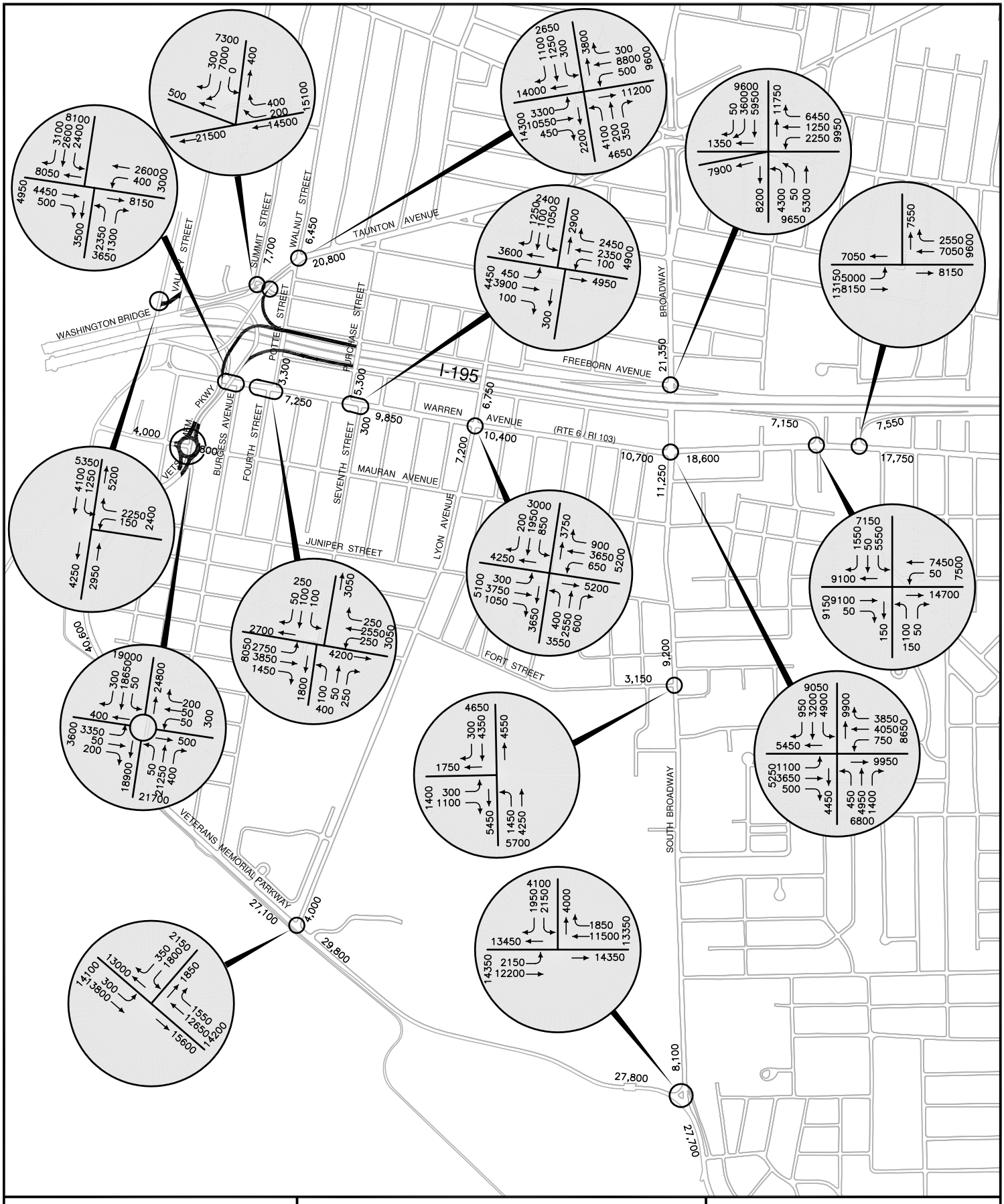


Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2030 BUILD
VETERANS MEMORIAL
PARKWAY 1
AADT
FREEWAY VOLUMES

FIGURE 23



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

2030 BUILD
VETERANS MEMORIAL
PARKWAY 1
AADT
INTERSECTION VOLUMES

FIGURE 24

Table 1
Comparison of Traffic Assignments

Location	2004 AADT Existing Condition	2030 AADT No-Build Condition	2030 AADT Waterfront Drive 1 or 2	2030 AADT Vet. Memorial Pkwy.
I-195 West of Interchange	171,200	246,550	247,300	247,150
Percentage Increase compared to 2004		44%	44%	44%
Percent increase per year		1.41%	1.42%	1.42%
I-195 East of Interchange	117,000	160,200	168,250	167,300
Percentage Increase compared to 2004		37%	44%	43%
Percent increase per year		1.22%	1.41%	1.38%
I-195/Taunton Ave/Warren Ave Interchange				
I-195 EB off-ramp	20,300	34,100	35,200	35,500
I-195 WB on-ramp	30,400	43,600	43,300	42,700
Sum of existing ramps	50,700	77,700	78,500	78,200
Percentage Increase compared to 2004		53%	55%	54%
Percent increase per year		1.66%	1.70%	1.68%
New I-195 EB on-ramp			6,150	3,600
New I-195 WB off-ramp			2,250	2,850
Sum of new ramps			8,400	6,450
I-195/Warren Avenue/Broadway Interchange				
I-195 WB off-ramp	7,700	12,200	10,600	9,950
I-195 EB on-ramp	6,700	9,700	7,000	7,550
Total Ramp Volumes	14,400	21,900	17,600	17,500
Percentage Decrease of 2030 Build vs. no-build			20%	20%
Warren Avenue				
Btw. Potter Street & Purchase Street	9,800	13,900	12,200	7,050
Btw. Purchase Street & Lyon Avenue	9,900	12,050	9,900	9,600
Btw. Lyon Avenue & Broadway	9,400	12,500	10,400	10,550
Btw. Broadway & I-195 EB ramps	16,900	19,200	18,300	18,400
Avg. decrease in traffic compared to 2030 No-build			1,700	3,000

Drive alternatives do relieve traffic on Warren Avenue, they also attract an element of traffic to traveling to and from the new ramps.

3.3 Capacity Analysis

Capacity analyses were conducted for key intersections and the freeway components within the project study area. Initially, the base year 2004 conditions were analyzed based upon the existing roadway conditions. Then, the future year 2030 traffic volumes were analyzed based upon the existing roadway conditions along with any known roadway projects that will be completed by 2030. These analyses serve as a basis for comparison. Lastly, the traffic assignments for the build alternatives were analyzed in terms of capacity analyses and compared to the results of the 2030 No-build condition.

The capacity analyses were conducted using the procedures contained in the 2000 Highway Capacity Manual (HCM). The adequacy of traffic operations on any given section of roadway or at a particular intersection is expressed in terms of its "level of service." The concept of level of service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

For analysis purposes, level of service is expressed with letter designations as a range of A through F, with "A" representing the best conditions and "F" representing the worst. Level of Service A can generally be described as a condition of free flow with very little delay experienced by the driver, and virtually no interference from other vehicles. Level of service F, on the other hand, is a forced-flow condition, with "stop and go" traffic, excessive backups at traffic signals and undue delay and inconvenience to the motorists. Within these two extremes, level of service C represents a condition of stable operation. In urban areas such as East Providence, level of service “D” is generally considered acceptable.

Traffic analyses have been completed for the AM and PM peak hour traffic conditions under the following scenarios:

- 2004 Existing Conditions
- 2030 No-build Condition
- 2030 Waterfront Drive 1

- 2030 Waterfront Drive 2
- 2030 Veterans Memorial Parkway 1

Capacity Analyses for Intersections

Level of service (LOS) at an intersection is based upon the vehicle delay. A summary of the intersection capacity analysis results for the AM peak hour condition is shown in Table 2 for the unsignalized intersections and in Table 3 for the signalized intersections. Similarly, the results of the intersection capacity analyses for the PM peak hour are shown in Tables 4 and 5.

Freeway Capacity Analyses

The various components of the I-195 within the study area were analyzed in terms of capacity. The components included freeway segments, ramp junctions and weave sections. The analyses were conducted for the 2004 existing traffic volumes, the projected 2030 No-build condition, and the three build alternatives.

Freeway Segments

A basic freeway segment is the portion of freeway that is not influenced by ramps and/or weaving sections. The operations of a freeway segment are related to the density, measured as passenger cars per mile per lane (pc/mi/ln), speed and volume-to-capacity ratio. The LOS results of the freeway segment capacity analyses are shown in Table 6.

Freeway Weaving Segments

A freeway weaving segment is the portion of freeway in which two or more traffic streams traveling in the same direction must cross paths without the assistance of traffic control devices in order to proceed in their desired route. Weaving segments occur when a merge area is closely followed by a diverge area. For a weaving segment to occur when a merge ramp is followed by a diverge ramp, an auxiliary lane must run between the two. The results of the weaving analyses applied to this project are shown in Table 6.

Ramp-Freeway Junctions

Ramp-freeway junctions represent the portions of freeway upon which the entering and exiting maneuvers take place. Ideally, on-ramp traffic merges into the freeway traffic stream and off-ramp traffic diverges out of the freeway traffic stream without disruption to the freeway traffic. Similar to freeway segments and weaving segments, the LOS of a freeway-ramp junction is defined by density. The results of the capacity analyses for freeway-ramp junctions on this project are shown in Table 6.

TABLE 2
SUMMARY OF UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS
AM PEAK HOUR

	UNSIGNALIZED INTERSECTIONS	LEVEL OF SERVICE/AVG. TOTAL DELAY(Sec./Veh.) 2004 EXISTING	2030 NO-BUILD	Upgrade/ TSM Alt.	Waterfront Dr 1& 2	Vet. Mem. Pkwy
1.	**MAURAN/VET. MEM. PKWY**					
	MAURAN AVE. EB RIGHT	B/14.2	F/65.6	F/65.6		
	ROUNDABOUT				A/7.0	B/11.2
2.	**TAUNTON/WALNUT**					
	TAUNTON AVE. EB	B/12.8	C/15.7	C/15.7	C/15.3	B/14.1
	TAUNTON AVE. WB	A/9.5	B/11.8	B/11.8	B/13.0	B/11.6
	WALNUT ST. NB	F/*	F/*	F/*	F/*	F/*
	WALNUT ST.SB	F/*	F/*	F/*	F/*	F/*
	* indicates that delay cannot be reasonably estimated at this LOS					
3.	**WARREN/PURCHASE**					
	WARREN AVE EB LEFT	A/9.1	B/11.8	B/11.8	B/11.8	B/10.7
	PURCHASE ST. SB	C/18.8	F/*	F/*	F/139.5	F/385.0
4.	**TAUNTON/SUMMIT**					
	SUMMIT ST. SB RIGHT	F/*	F/*	F/*	F/*	F/*
5.	**WARREN/EXIT 5 OFF-RAMP**					
	OFF RAMP SB LEFT	B/13.1	F194.7			E/44.1
	OFF RAMP SB RIGHT	B/10.1	F/62.5	Signalization	Signalization	C/18.0
	COMBINED	B/11.6	F/107.3			D/30.9
	Note: proposed improvements at this location include signalization- see signalized results					
6.	**WARREN/POTTER**					
	WARREN AVE EB	A/8.9	B/10.7			A/7.9
	WARREN AVE WB	A/7.6	A/8.4			A/8.2
	POTTER ST. SB	F/204.4	F/*	Signalization	Signalization	C/16.9
	FOURTH ST. NB	E/41.3	F/*			C/18.0
	Note: proposed improvements at this location include signalization- see signalized results					
7.	**WARREN/BURGESS**					
	WARREN AVE WB	A/7.8	A/7.8	A/7.8	A/9.1	A/8.7
	BURGESS ST.NB	B/14.3	B/14.3	B/14.3	E/47.0	E/36.4
8.	**TAUNTON/WATERFRONT DR.**					
	TAUNTON AVE WB	NA	NA	NA	E/37.3	B/13.3
	WATERFRONT DR. SB				A/9.1	A/7.8
9.	**I-195 WB/WATERFRONT DR.**					
	I-195 WESTBOUND	NA	NA	NA	D/31.8	NA

* indicates that delay cannot be reasonably estimated at this LOS

TABLE 3
SUMMARY OF SIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS
AM PEAK HOUR

		LEVEL OF SERVICE/AVG. TOTAL DELAY(Sec./Veh.)				
	SIGNALIZED INTERSECTIONS	**2004 EXISTING**	**2030 NO-BUILD**	**Upgrade/ TSM Alt.**	**Waterfront Dr 1& 2**	**Vet. Mem. Pkwy**
1.	**WARREN/LYON**					
	WARREN AVE. EB	A/9.4	B/11.0	B/11.0	A/9.0	B/10.4
	WARREN AVE. WB	B/19.9	F/173.4	F/173.4	B/16.7	B/17.0
	LYON AVE. NB	A/9.1	B/11.7	B/11.7	B/14.4	B/13.5
	LYON AVE. SB	A/8.0	B/14.7	B/14.7	B/10.7	B/10.0
	OVERALL INTERSECTION	B/14.0	F/82.1	F/82.1	B/13.7	B/13.8
2.	**WARREN/BROADWAY**					
	WARREN AVE. EB	F/88.5	F/204.7	F/204.7	F/93.3	D/51.1
	WARREN AVE. WB	C/33.8	E/57.3	E/57.3	D/37.1	C/26.4
	BROADWAY NB	A/9.0	B/15.2	B/15.2	B/12.0	B/13.5
	BROADWAY SB	F/143.1	F/350.9	F/350.9	F/340.5	F/443.2
	OVERALL INTERSECTION	E/63.4	F/162.6	F/162.6	F/123.9	F/132.4
2A	**WARREN/BROADWAY -w/ improvements**					
	WARREN AVE. EB			C/23.6	B/15.7	B/16.5
	WARREN AVE. WB			E/63.7	C/30.1	C/28.0
	BROADWAY NB			D/49.3	C/28.3	C/26.7
	BROADWAY SB			D/37.3	B/16.6	B/17.0
	OVERALL INTERSECTION			D/43.6	C/24.1	C/23.2
3.	**WARREN/I-195 EB OFF-RAMP (EXIT 6)**					
	WARREN AVE. EB	C/26.7	F/112.0	F/112.0	E/78.5	F/110.0
	WARREN AVE. WB	B/11.6	F/106.5	F/106.5	F/143.6	D/38.8
	SLOCUM STREET	B/15.3	C/20.0	C/20.0	C/20.2	A/0.0
	I-195 OFF-RAMP	C/28.5	F/116.9	F/116.9	F/142.1	F/108.8
	OVERALL INTERSECTION	C/21.9	F/111.1	F/111.1	F/118.7	F/88.6
4.	**I-195 WB OFF-RAMP/FREEBORN**					
	I-195 WB OFF-RAMP	D/36.6	D/40.2	D/40.2	E/66.8	D/51.0
	BROADWAY ST. NB	D/45.9	F/132.0	F/132.0	D/48.1	D/43.4
	BROADWAY ST. SB	B/18.5	C/24.3	C/24.3	B/18.1	B/17.9
	OVERALL INTERSECTION	D/35.6	E/69.2	E/69.2	D/45.2	D/38.1
5	**WARREN AVE./EXIT 5 OFF-RAMP-WITH IMPROVEMENTS**					
	WARREN AVE EB APPROACH			B/17.5	B/14.2	
	WARREN AVE WB APPROACH			A/8.2	A/7.0	
	I-195 EB OFF-RAMP APPROACH			B/19.7	B/12.0	
	OVERALL INTERSECTION			B/16.8	B/12.0	
6	**WARREN AVE./POTTER ST/FORTH ST-WITH IMPROVEMENTS**					
	WARREN AVE EB APPROACH			C/20.7	A/7.6	
	WARREN AVE WB APPROACH			D/54.6	B/16.9	
	FORTH ST NB APPROACH			F/83.4	B/19.0	
	POTTER ST SB APPROACH			F/83.4	B/11.9	
	OVERALL INTERSECTION			D/54.5	B/13.9	

TABLE 4
SUMMARY OF UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS
PM PEAK HOUR

	UNSIGNALIZED INTERSECTIONS	LEVEL OF SERVICE/AVG. TOTAL DELAY(Sec./Veh.) 2004 EXISTING	2030 NO-BUILD	Upgrade/ TSM Alt.	Waterfront Dr 1& 2	Vet. Mem. Pkwy
1.	**MAURAN/VET. MEM. PKWY**					
	MAURAN AVE. EB RIGHT	B/14.1	F/594.6	F/594.6		
	ROUNDABOUT				A/9.2	C/21.5
2.	**TAUNTON/WALNUT**					
	TAUNTON AVE. EB	B/11.5	B/12.8	B/12.8	B/13.3	B/12.6
	TAUNTON AVE. WB	A/9.4	B/10.3	B/10.3	B/10.8	B/10.2
	WALNUT ST. NB	F/*	F/*	F/*	F/*	F/*
	WALNUT ST.SB	F/*	F/*	F/*	F/*	F/*
	* indicates that delay cannot be reasonably estimated at this LOS					
3.	**WARREN/PURCHASE**					
	WARREN AVE EB LEFT	A/8.8	A/9.8	A/9.8	A/9.0	B/11.8
	PURCHASE ST. SB	D/25.9	F/85.4	F/85.4	E/43.0	F/184.9
4.	**TAUNTON/SUMMIT**					
	SUMMIT ST. SB RIGHT	F/*	F/*	F/*	F/*	F/*
5.	**WARREN/EXIT 5 OFF-RAMP**					
	OFF RAMP SB LEFT	D/30.0	F/*			F/377.3
	OFF RAMP SB RIGHT	A/9.6	B/14.8	Signalization	Signalization	C/16.5
	COMBINED	C/24.5	F/499.5			F/184.5
	Note: proposed improvements at this location include signalization- see signalized results					
6.	**WARREN/POTTER**					
	WARREN AVE EB	A/8.8	B/11.5			A/8.2
	WARREN AVE WB	A/8.4	A/8.7	Signalization	Signalization	B/10.1
	POTTER ST. SB	C/17.7	F/*			D/25.6
	FOURTH ST. NB	E/40.7	F/*			E/35.7
	Note: proposed improvements at this location include signalization- see signalized results					
7.	**WARREN/BURGESS**					
	WARREN AVE WB	A/9.1	B/12.4	B/12.4	B/11.8	B/10.3
	BURGESS ST.NB	C/17.0	F/121.8	F/121.8	F/61.8	F/124.7
8.	**TAUNTON/WATERFRONT DR.**					
	TAUNTON AVE WB	NA	NA	NA	F/91.0	B/13.5
	WATERFRONT DR. SB				A/9.5	A/8.6
9.	**I-195 WB/WATERFRONT DR.**					
	I-195 WESTBOUND	NA	NA	NA	E/38.7	NA

TABLE 5
SUMMARY OF SIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS
PM PEAK HOUR

		LEVEL OF SERVICE/AVG. TOTAL DELAY(Sec./Veh.)				
	SIGNALIZED INTERSECTIONS	**2004 EXISTING**	**2030 NO-BUILD**	**Upgrade/ TSM Alt.**	**Waterfront Dr 1& 2**	**Vet. Mem. Pkwy**
1.	**WARREN/LYON**					
	WARREN AVE. EB	B/15.8	B/17.0	B/17.0	B/16.6	B/14.2
	WARREN AVE. WB	B/18.2	D/41.3	D/41.3	C/21.3	B/19.6
	LYON AVE. NB	A/8.8	B/13.5	B/13.5	B/19.0	B/17.9
	LYON AVE. SB	A/8.2	B/10.6	B/10.6	B/11.4	B/14.6
	OVERALL INTERSECTION	B/14.6	C/23.8	C/23.8	B/17.8	B/16.7
2.	**WARREN/BROADWAY**					
	WARREN AVE. EB	D/35.4	F/136.7	F/136.7	F/179.9	D/44.3
	WARREN AVE. WB	F/94.4	F/352.7	F/352.7	F/225.0	F/111.8
	BROADWAY NB	B/14.5	F/147.4	F/147.4	D/50.9	C/34.2
	BROADWAY SB	F/144.8	F/473.9	F/473.9	F/292.1	F/417.7
	OVERALL INTERSECTION	F/85.0	F/308.7	F/308.7	F/209.6	F/175.4
2A	**WARREN/BROADWAY -w/ improvements**					
	WARREN AVE. EB			B/17.6	B/16.3	B/17.3
	WARREN AVE. WB			C/28.7	D/38.8	C/29.8
	BROADWAY NB			C/24.2	D/42.6	C/33.2
	BROADWAY SB			C/21.2	C/34.1	C/20.5
	OVERALL INTERSECTION			C/26.1	C/34.0	C/25.0
3.	**WARREN/I-195 EB OFF-RAMP (EXIT 6)**					
	WARREN AVE. EB	C/21.8	D/48.6	D/48.6	D/38.5	D/43.2
	WARREN AVE. WB	B/10.7	D/44.4	D/44.4	E/64.6	C/23.2
	SLOCUM STREET	B/11.6	B/18.9	B/18.9	B/15.7	A/0.0
	I-195 OFF-RAMP	C/21.4	E/61.7	E/61.7	E/63.3	D/51.6
	OVERALL INTERSECTION	B/18.2	D/50.9	D/50.9	D/54.8	D/39.7
4.	**I-195 WB OFF-RAMP/FREEBORN**					
	I-195 WB OFF-RAMP	D/35.4	F/363.2	F/363.2	E/64.9	D/52.4
	BROADWAY ST. NB	C/23.3	F/152.6	F/152.6	E/69.7	E/61.5
	BROADWAY ST. SB	B/16.5	C/22.8	C/22.8	C/32.8	C/34.6
	OVERALL INTERSECTION	C/26.9	F/215.0	F/215.0	E/58.4	D/51.0
5	**WARREN AVE./EXIT 5 OFF-RAMP-WITH IMPROVEMENTS**					
	WARREN AVE EB APPROACH			D/35.8	C/28.2	
	WARREN AVE WB APPROACH			A/5.3	A/6.4	
	I-195 EB OFF-RAMP APPROACH			D/52.2	C/34.8	
	OVERALL INTERSECTION			D/37.1	C/28.2	
6	**WARREN AVE./POTTER ST/FORTH ST-WITH IMPROVEMENTS**					
	WARREN AVE EB APPROACH			C/25.3	B/12.5	
	WARREN AVE WB APPROACH			C/30.5	C/29.1	
	FORTH ST NB APPROACH			D/39.1	D/37.0	
	POTTER ST SB APPROACH			D/39.2	B/13.4	
	OVERALL INTERSECTION			C/30.2	C/23.0	

Table 6
Summary of Freeway Capacity Analyses
Level of Service - Density (pc/mi/ln) - Mean Speed (mph)

	2004 Existing Condition			2030 No-Build & Upgrade/TSM Alt.			2030 Build Waterfront Drive 1			2030 Build Waterfront Drive 2			2030 Build Vet. Mem. Pkwy		
	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed
AM PEAK HOUR															
Freeway Segments															
I-195 EB between Exit 4/5 and Exit 6	C	23	60	F	*	*	F	*	*	F	*	*	F	*	*
I-195 WB between Exit 4/5 and Exit 6	D	30	60	E	37	56	E	39	55	see weave analysis			see weave analysis		
Diverge Analyses															
I-195 EB Exit 4 off-ramp	C	21	53	F	41	46	F	40	46	F	40	46	F	35	47
I-195 EB Exit 5 off-ramp	C	26	56	E	39	51	E	39	51	E	39	51	E	37	51
I-195 EB Exit 6 off-ramp	C	27	55	F	42	53	F	43	53	F	43	53	F	43	53
I-195 WB Exit 4/5 new off-ramp	-----	-----	-----	-----	-----	-----	E	38	55	see weave analysis			see weave analysis		
I-195 WB Exit 6 off-ramp	C	28	51	D	34	50	D	32	51	D	32	51	D	32	51
Merge Analyses															
I-195 WB Exit 6 on-ramp	D	29	53	D	33	52	D	34	51	see weave analysis			see weave analysis		
I-195 EB Exits 4/5 New On-ramp	-----	-----	-----	-----	-----	-----	F	43	44	F	43	43	F	42	45
Weaving Analyses															
I-195 WB between Exits 4 & 3	F	69		F	66		F	64		F	64		F	58	
Weaving Segment Speed			34 mph			34 mph			34 mph			34 mph			35 mph
I-195 WB btw. Exits 6 & New Ramp at 4/5	-----	-----	-----	-----	-----	-----	-----	-----	-----	D	35		E	37	
Weaving Segment Speed												48 mph			44 mph

Table 6 -continued
Summary of Freeway Capacity Analyses
Level of Service - Density (pc/mi/ln) - Mean Speed (mph)

	2004 Existing Condition			2030 No-Build & Upgrade/TSM Alt.			2030 Build Waterfront Drive 1			2030 Build Waterfront Drive 2			2030 Build Vet. Mem. Pkwy		
	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed
PM PEAK HOUR															
Freeway Segments															
I-195 EB between Exit 4/5 and Exit 6	D	32	59	E	43	53	F	*	*	F	*	*	F	*	*
I-195 WB between Exit 4/5 and Exit 6	C	21	60	F	*	*	F	*	*	see weave analysis			see weave analysis		
Diverge Analyses															
I-195 EB Exit 4 off-ramp	F	29	52	F	32	47	F	33	47	F	33	47	F	31	48
I-195 EB Exit 5 off-ramp	D	34	55	D	33	51	D	33	51	D	33	51	D	33	52
I-195 EB Exit 6 off-ramp	D	34	55	E	38	54	F	40	54	F	40	54	F	41	53
I-195 WB Exit 4/5 new off-ramp	-----	-----	-----	-----	-----	-----	F	41	54	see weave analysis			see weave analysis		
I-195 WB Exit 6 off-ramp	C	24	51	E	38	50	E	37	50	E	37	50	E	37	50
Merge Analyses															
I-195 WB Exit 6 on-ramp	C	21	55	E	37	50	F	38	49	see weave analysis			see weave analysis		
I-195 EB Exits 4/5 New On-ramp	-----	-----	-----	-----	-----	-----	F	38	48	F	38	48	F	39	48
Weaving Analyses															
I-195 WB between Exits 4 & 3	E	40		F	51		F	60		F	60		F	59	
Weaving Segment Speed			40 mph			40 mph			37 mph			37 mph			37 mph
I-195 WB btw. Exits 6 & New Ramp at 4/5	-----	-----	-----	-----	-----	-----	-----	-----	-----	E	39		F	43	
Weaving Segment Speed												48 mph			44 mph

* Indicates that density and speed could not be estimated at this LOS.

Comparison of Capacity Analysis Results

The initial comparison is between the peak hour traffic operations of the 2004 Existing Conditions and the 2030 No-build condition. The additional traffic anticipated on the freeway by 2030 brings the LOS of the various freeway segments down from the current LOS "C" and "D" that exists in 2004 to projected LOS "E" and "F" by 2030 in the peak hour conditions. Similarly, the intersections along Warren Avenue deteriorate in LOS from 2004 to 2030 with a few intersections reaching LOS "F" in the 2030 peak periods.

The results for the Upgrade/TSM alternative are similar to the results of the 2030 No-build condition except for select intersections where improvements are proposed. The intersections of Warren Avenue/Exit 5 off-ramp and Warren Avenue/Potter Street will be signalized under the Upgrade/TSM alternative. With signalization, the levels of service at these locations improve . Also, improvements proposed at Warren Avenue/Broadway under the Upgrade/TSM alternative improve level of service from LOS "F" to LOS "C" or "D" in the peak periods.

The results of the capacity analyses for the build alternatives were compared to the results for the 2030 No-build condition. All three build alternatives showed improvements to the LOS at major intersections along Warren Avenue en route to Exit 6. LOS improved from LOS "F under the No-build condition to LOS "B", "C", and "D" depending on the exact location. Intersection improvements have been developed for some of the Warren Avenue intersections and are included in the build alternatives. These intersections include Warren Avenue/I-195 eastbound off-ramp, Warren Avenue/Potter Street and Warren Avenue/Broadway.

As for the freeway operations, the build alternatives did not significantly alter the projected LOS along the freeway. The analysis of existing freeway operations shows LOS primarily in the range of "C" or "D". However, drivers on I-195 in the peak periods today often experience long delays due to residual back-ups on I-195 that begin in Providence and delays due to the weaving section and diverge near Exit 4. By 2030, the freeway is expected to operate at or over capacity. The inclusion of two additional ramps does not alter the overall operation projected along the freeway. While there were some specific locations with an increase or decrease in LOS, overall, the freeway operations are poor in 2030 under the No-build and build conditions.

3.4 Accident Analysis

Accident data was collected from the Rhode Island Department of Transportation (RIDOT) and the City of East Providence Police Department for the project study area. The data covered a three-year period from 2001 to 2003. The data was categorized as intersection-related and roadway segment accidents. Intersection accidents included accidents that occurred within 200 feet of an intersection. The accident data is summarized in terms of the number of accidents that resulted in property damage only (PDO) and the number of accidents that resulted in personal injury. In the three-year period, there were two fatalities reported in the project area. One involved a pedestrian crossing Interstate Route 195 in the vicinity of Exit 4. The other fatality occurred during a head-on collision on Veterans Memorial Parkway near South Broadway.

Accident locations with five or more accidents in a twelve-month period were cited for further analysis. Accident rates were calculated for these locations. An accident rate relates the number of accidents occurring at a given location to the number of vehicles utilizing the roadway or intersection. Intersection accident rates are expressed as the number of accidents per million entering vehicles (MEV), and roadway segment accidents are expressed in terms of the number of accidents per 100 million vehicle miles (100 MVM) traveled.

The accident rates are shown in Table 7. Some states develop criteria for ranking accident locations. In the absence of state generated comparison rates, the industry standard has generally accepted that intersection accident rates greater than 1.5 accidents/MEV and roadway segment accident rates greater than 280 accidents/100 MVM are indicative of locations worthy of further study. This comparison has been applied to this study. As indicated in the table, five intersections and two roadway segments meet this criteria for further analysis.

The freeway accidents were plotted on mapping to identify clusters of accidents. On I-195 eastbound, clusters of accidents were revealed in the vicinity of Exits 4 and 5. In the westbound direction on I-195, cluster of accidents were identified in the vicinity of Exit 6. Many of these accidents occurred in the peak periods and involved rear-end collisions as motorists approached a back-up of freeway traffic on the highway.

Collision diagrams were plotted for the major intersections with accident rates greater than 1.5 accidents/MEV. Collision diagrams illustrate a vehicle's path and collision type at the time of an accident. Collision diagrams are used to search for patterns and/or causes of accidents

at a particular location. Note that construction activities were occurring on I-195 as part of the Washington Bridge Project and the construction of the Taunton Avenue eastbound off-ramp during the three-year period for which accident data was reviewed. The construction activities may have contributed to the elevated occurrence of accidents on I-195.

Intersections with accident rates greater than 1.5 accidents/MEV are briefly discussed individually below. For more detail, refer to Technical Memorandum No. 1, Traffic Projections and Analyses.

Warren Avenue @ Lyon Avenue. The signalized intersection experiences primarily angle and rear-end collisions. Potential improvements at this intersection include replacing the eight-inch signal heads with twelve-inch heads, providing LED lenses to improve visibility and revising the signal timing to allow longer green time for the side street traffic.

Broadway @ Freeborn Avenue and I-195 Ramps. Rear-end and side-swipe collisions are predominant at this intersection. The accidents here tend to involve a thru vehicle maneuvering around a vehicle waiting to turn onto the I-195 ramp. It is important to note, however, that the lane arrangement at this intersection has recently been reconfigured through a re-striping under the bridge rehabilitation project for the I-195 bridge over Broadway. The accident data reflects construction conditions. Further analysis is recommended at this location after the new configuration has been in service and the construction activities have ceased.

Broadway at Mauran Avenue. The unsignalized intersection has sight distance problems to the south. Potential improvements at this location include relocating the commercial sign that blocks sight distance and replacing sidewalk trees with trees that are less massive.

Broadway at Warren Avenue. Broadway at Warren Avenue is a high volume signalized intersection with rear-end, angle and side-swipe collisions. Based on a field review of the intersection, there are numerous curb cuts along both Broadway and Warren Avenue that fall in close proximity to the intersection. Improvements to this intersection are proposed under the build alternatives and the Upgrade/TSM alternative to improve traffic operations. The proposed improvements involve increasing the capacity through the signalized intersection by allowing two through lanes on Warren Avenue. The types of improvements necessary to improve safety at this intersection involve limiting the number of curb cuts in close proximity to the intersection, limiting the curb cuts to right in/right out only, or implementing turn restrictions perhaps by installing median islands on the intersection approaches.

Warren Avenue at Pawtucket Avenue. The signalized intersection of Warren Avenue/Pawtucket Avenue services a high volume of traffic with rear-end, angle and side-swipe collisions. To reduce accidents at this intersection, the City of East Providence should consider reducing the number of curb cuts near the intersection, limiting the commercial driveways in close proximity to the intersection to right in/right out movements, or implementing turn restrictions by installing median islands on the intersection approaches.

Table 7
ACCIDENT RATE SUMMARY

Major Road	Intersection	Average # Accidents/ Year	Entering Volume (ADT)	Accident Rate (A/MEV)
Lyon Avenue	@ Warren Avenue	7.7	12800	1.64
	@ Veteran's Memorial Parkway	5.7	22000	0.71
S. Broadway	@ Warren Avenue	27.7	26300	2.88
	@ Mauran Avenue	7.0	9900	1.94
	@ Freeborn Avenue	19.0	22600	2.30
	@ Veteran's Memorial Parkway	6.3	24800	0.70
Taunton Avenue	@ Summit Street	5.0	15400	0.89
	@ James Street	6.7	21000	0.87
	@ Purchase Street	5.3	23000	0.64
Vet. Mem. Pky	@ First Street	9.7	17900	1.48
Warren Avenue	@ Pawtucket Avenue	52.3	26300	5.45
	@ Brightridge Street	7.0	16200	1.18
	@ Slocum/Alford	6.0	20850	0.79

Roadway Segment	Roadway Segment Length (in feet) & Location	Average # Accidents/ Year	Entering Volume (ADT)	Accident Rate (A/100 MVM)
I-195	300 feet west of Exit 4 (EB)	11.3	81900	400
	Between Exit 4 and Potter St.(EB)	9.3	61600	231
	Between Potter & Broadway (EB)	8.0	58100	66
	Broadway to 195 On-Ramp (EB)	13.7	58100	284
	1000 feet east of Exit 6 (WB)	14.3	63200	328
	Exit 6 to 195 On-Ramp (WB)	32.0	55000	526
	195 On-Ramp to Purchase St. (WB)	10.3	58900	149
	Purchase St to VMP Overpass (WB)	9.3	58900	255

4.0 SOCIAL, ECONOMIC, CULTURAL, AND ENVIRONMENTAL IMPACTS

4.1 Social and Economic Impacts

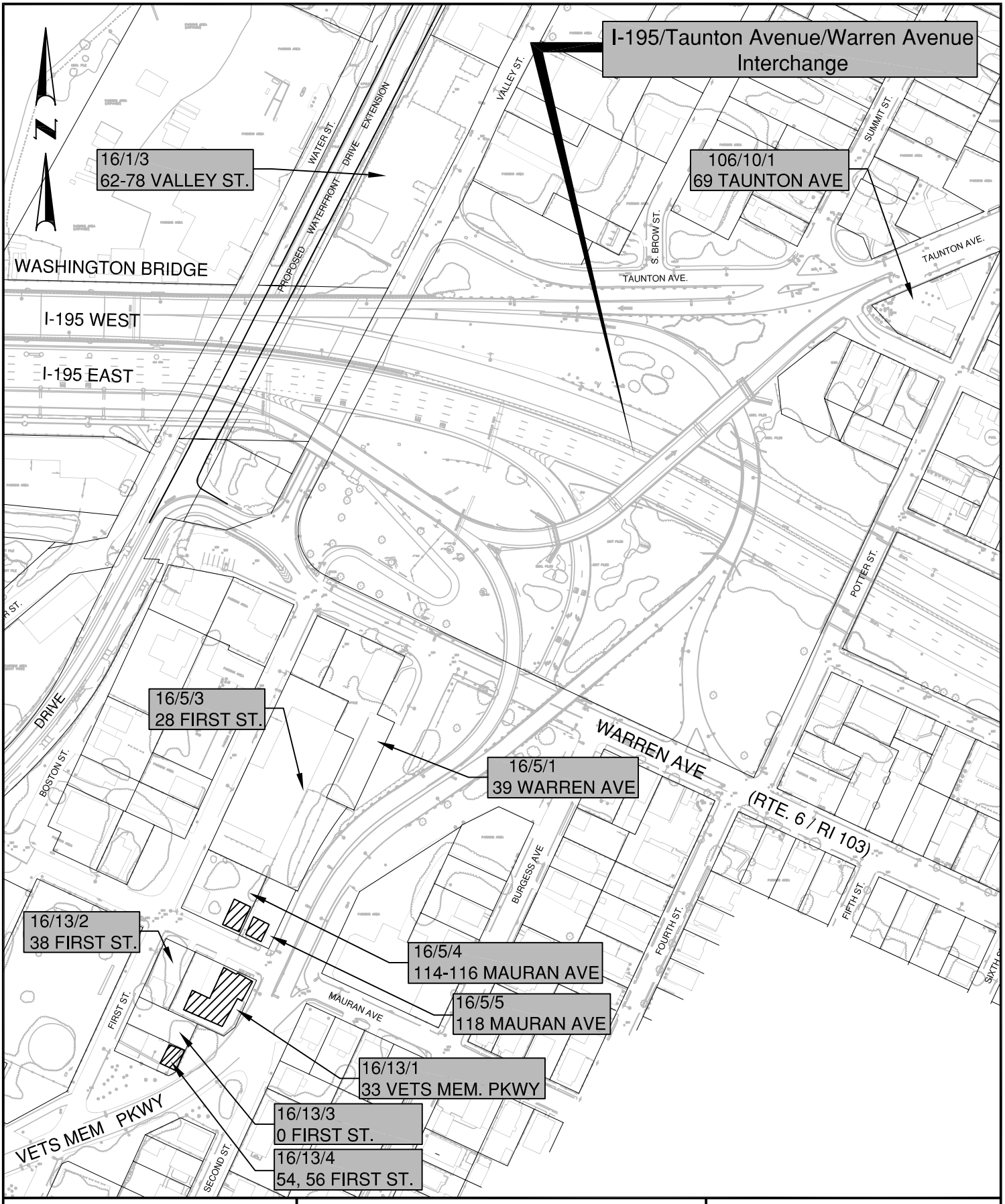
4.1.1 Property Acquisition

The proposed Upgrade/TSM alternative consists of intersection improvements and the conversion of Warren Avenue between Broadway and the I-195 eastbound ramps to three travel lanes. These improvements do not require property acquisition.

Each of the build alternatives requires property acquisition. Refer to Table 8 for a summary of the property acquisition for the build alternatives. Figure 25 shows the locations of the properties affected.

The area most affected in terms of property acquisition is in the vicinity of the proposed roundabout at Veterans Memorial Parkway and Mauran Avenue. The roundabout requires the removal of four structures including two multi-family residences, a multi-use residential/commercial building and a building housing an athletic club/bar. Since the roundabout concept is common to all three build alternatives, the structures removed under each of the three build alternatives are the same. Construction of the roundabout requires property acquisition from five properties. For Waterfront Drive 1 and 2, the property acquisition at these five properties totals 16,750 square feet (sf). Under the Veterans Memorial Parkway alternative, the total property acquisition in the vicinity of the roundabout increases to 26,097 sf. The increase is due to the proposed bike path along Veterans Memorial Parkway. The property impacts associated with the proposed roundabout represent the majority of property impact for the build alternatives. The additional impacts associated with each build alternative are described below:

Waterfront Drive 1. In addition to the five properties affected in the vicinity of the roundabout, Waterfront Drive 1 also affects one additional property. The property is required to construct the extension of Taunton Avenue between Valley Street and the Waterfront Drive. In total, Waterfront Drive 1 affects six properties requiring the removal of four structures and the acquisition of 52,486 sf of land.



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

PROPERTIES AFFECTED

SCALE: 1"=200'

FIGURE 25

Table 8
Summary of Property Acquisition

			Waterfront Drive 1 & 2			Veterans Memorial Parkway			
Map/Block/ Lot	**Property Address**	**Total Area (SF)**	**Property Acquired (SF)**	**Property Remaining (SF)**	**Building Being Taken**	**Property Acquired (SF)**	**Property Remaining (SF)**	**Building Being Taken**	**Type of Building**
16/1/3	62-78 Valley St.	46,839	35,736	11,103	No	17,747	29,092	No	
16/5/1	39 Warren Ave.	18,801	0	18,801	No	859	17,942	No	
16/5/3	28 First St.	42,338	246	42,092	No	5,093	37,245	No	
16/5/4	114-116 Mauran Ave.	10,060	1,175	8,885	Yes 1	3,772	6,288	Yes 1	MF Res
16/5/5	118 Mauran Ave.	5,030	5,030	0	Yes 1	5,030	0	Yes 1	Athletic Club/ Bar
16/13/1	33 Vet. Mem. Pkwy	9,980	9,980	0	Yes 1	9,980	0	Yes 1	Multi-use Res./Com.
16/13/2	38 First St.	5,030	0	5,030	No	108	4,922	No	
16/13/3	0 First St.	4,728	0	4,728	No	1,921	2,807	No	
16/13/4	54, 56 First St.	4,686	319	4,367	Yes 1	2,222	2,464	Yes 1	MF Res
106/10/1	69 Taunton Ave.	14,392	0	14,392	No	942	13,450	No	
TOTAL:			52,486		4 bldgs	47,674		4 bldgs	

Waterfront Drive 2. Under Waterfront Drive 2, the property impacts are the same as under Waterfront Drive 1. In total, Waterfront Drive 2 affects six properties requiring the removal of four structures and the acquisition of 52,486 sf.

Veterans Memorial Parkway. In addition to the five properties affected in the vicinity of the roundabout, Veterans Memorial Parkway also affects five additional properties. Two of these properties are affected by the construction of the bike path connection along Veterans Memorial Parkway. One property is associated with the proposed extension of Taunton Avenue between Valley Street and Waterfront Drive. The remaining two properties affected are a result of the proposed ramp from I-195 westbound to Taunton Avenue. In total, Veterans Memorial Parkway affects ten properties, requires the acquisition of 47,674 sf of property in total and the removal of four structures.

4.1.2 Municipal Tax Revenues

Removing taxable land and buildings from the municipal tax rolls for public (non-taxable) use represents one of the least visible impacts of highway construction projects. Estimates of municipal tax reductions for the City of East Providence were developed for the build alternatives. The Upgrade/TSM alternative does not require property acquisition and, therefore, does not affect the municipal tax revenues.

The estimates of tax loss for the build alternatives were developed on a lot-by-lot basis by reducing the tax revenue in proportion to the amount of land actually needed for the roadway project. The total property tax revenues for the City of East Providence were $127,935,000 based on the Fiscal Year 2006 tax rates. The estimated property tax loss for each of the build alternatives is as follows:

- Waterfront Drive 1 $16,102 (0.01% of 2006 revenues)
- Waterfront Drive 2 $16,102 (0.01% of 2006 revenues)
- Veterans Memorial Parkway $17,081 (0.01% of 2006 revenues)

Offsetting the projected revenue losses in the study area is the probability that an active real estate market (encouraged by public policy and improved roadway access) could ultimately provide a net gain in municipal tax revenues. The new access to and from the east on I-195 could spark development in the vicinity of the interchange and is expected to be a positive factor in the future development of the Waterfront Special Development District. Conversely, the No-

build alternative and Upgrade/TSM alternative have the potential to discourage real estate development because of the limited access to the nearby interstate highway system.

4.1.3 Relocations

The build alternatives do require relocations for the four structures that have to be acquired to construct the roundabout at Veterans Memorial Parkway/Mauran Avenue. The required displacements and estimated relocation costs are summarized below. Reference is made to Figure 25 for the location of the properties listed in Table 8.

Plat/Map/Parcel	**Estimated Relocation Costs**
16/5/4	$40,000.00
16/5/5	$25,000.00
16/13/1	$75,000.00
16/13/4	$40,000.00
Total Relocation Costs:	$180,000.00

The acquisition and relocation program will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Affected property owners would be provided with a variety of compensation measures including the following:

- Fair market value for acquired property
- Relocation advisory services
- Payments for moving and relocations costs
- Replacement housing for homeowners
- Replacement housing for tenants

The homeowners and tenants involved in the displacements will be provided relocation assistance by the Rhode Island Department of Transportation's Relocation Section without discrimination. Adequate staff will be available to assist each displacee on an individual basis, providing advisory services as needed. Any unique situations or individual hardships (financial or otherwise) will be identified when the individual interviews are undertaken at the start of the acquisition process.

A Conceptual Stage Relocation Report has been prepared for this project by the Real Estate Section of the Rhode Island Department of Transportation. The complete report is contained in Technical Memorandum No. 2. A summary of the key conclusions reached in that report is as follows:

After reviewing the available listings for the Statewide Multiple Listing Service and having a familiarity with the current real estate market, it was determined that there is adequate residential, commercial and warehouse properties available to accommodate the displaced residential and commercial property owners. Also, there is sufficient inventory for purchase or rent, inclusive of single-family homes, apartments, and commercial property. The number of available properties in the market area, which are similar with respect to size and value, equal or exceed the number of displacements.

4.1.4 Employment and Business Activity

As discussed in the previous section, the build alternatives require the relocation of four structures. One of these structures is an athletic club/bar, and another structure is a multi-use residential/commercial building. These relocations are not expected to reduce employment and business activity, because the potential exists to relocate these businesses within the City of East Providence, as concluded in the Conceptual Stage Relocation Report prepared by Rhode Island Department of Transportation Real Estate Unit.

Employment and business activity in the study area is expected to remain unchanged under the No-build and Upgrade/TSM alternatives, since travel paths are not altered and relocations are not necessary.

The build alternatives reduce the amount of traffic on Warren Avenue. This can result in both positive and negative impacts for the businesses that are adjacent to Warren Avenue. There are some businesses on Warren Avenue that benefit from heavy traffic through passerby trips, or trips that are made for convenience by motorists already on the road. These types of business trips would be reduced. Waterfront Drive 1 and 2 reduces traffic on Warren Avenue by approximately 11 percent. Veterans Memorial Parkway reduces Warren Avenue traffic by approximately 23 percent. Although Warren Avenue traffic is reduced, there is still a high volume of traffic traveling on Warren Avenue. Also, the build alternatives are expected to

Furthermore, the build alternatives improve highway access to the Waterfront area by providing a highway connection to and from the east. The redevelopment plans for the Waterfront area will increase employment and business activity in the City of East Providence. The improved access of the build alternatives enhances the development opportunities for the Waterfront area, which, in turn, increases employment and business in the City of East Providence.

4.1.5 Neighborhoods and Community Cohesion

Aside from a reduction in on-street parking under the Upgrade/TSM alternative, neighborhoods and community cohesion will remain unchanged under the No-build and Upgrade/TSM alternatives. The Upgrade/TSM alternative does require the removal of on-street parking on one side of Warren Avenue between Broadway and the I-195 eastbound ramps. Parking surveys taken at various times on weekdays on this portion of Warren Avenue revealed that approximately 20 percent of the available on-street parking is utilized. Since the Upgrade/TSM alternative maintains parking on one side of Warren Avenue between Broadway and the I-195 ramps, the loss of on-street parking is not considered a significant impact.

The effects of each build alternative on the neighborhoods and community cohesion are described below.

Waterfront Drive 1 & 2. The new ramps of Waterfront Drive 1 and 2 are located within the existing I-195 highway corridor and will have minimal impact on the adjacent neighborhoods. Even where closest to the neighborhoods, the ramps are significantly lower than adjacent neighborhood streets. The mixed residential/commercial area west of Veterans Memorial Parkway is a neighborhood in which the change between residential and commercial land use takes place. While this area will be impacted by the construction of the proposed roundabout at Veterans Memorial Parkway/Mauran Avenue, this area will be more notably impacted by the Waterfront District development.

Veterans Memorial Parkway. Similar to Waterfront Drive 1 and 2, the construction of the proposed roundabout at Veterans Memorial Parkway/Mauran Avenue will impact the neighborhood west of Veterans Memorial Parkway. This area is more severely impacted by the proposed waterfront development.

In addition to the impacts of the roundabout and waterfront development noted, the Veterans Memorial Parkway alternative impacts neighborhood traffic to a greater degree than the Waterfront Drive 1 and 2 alternatives. The westbound off-ramp to Taunton Avenue will bring traffic to an already busy area of Taunton Avenue. In addition, with the closure of the Potter Street bridge, local traffic between Taunton and Warren Avenues could move to Purchase Street, a street already complicated by the traffic near a school. The removal of the Potter Street bridge also would break pedestrian connections between the neighborhoods north and south of I-195.

4.1.6 Access to Community Facilities and Services

A number of community facilities exist within the study area, including ball fields, churches, parks, the East Bay Bike Path and the scenic overlooks along Veterans Memorial Parkway. Access to these facilities will remain as it exists today under the No-build and Upgrade/TSM alternatives. Under the build alternatives, access is still provided to each of the community facilities, although the path of travel may be altered. Since the local churches and ball fields likely attract trips from the surrounding neighborhoods, the proposed new interstate highway access is not expected to alter the travel paths to these facilities and services. Trips to the East Bay Bike Path or Veterans Memorial Parkway scenic overlooks will be improved for motorists utilizing the interstate highway to the east of the subject interchange.

The build alternatives do not negatively impact public facilities and community services that are outlined in the East Providence Comprehensive Plan, such as schools, police and fire, library, human services and public works.

4.1.7 Park and Recreation Areas

The locations of the four study area parks and recreational areas are shown on Figure 26. They include:

- John Lewis Park, which is located at the terminus of Mauran Avenue at Pier Road. The waterfront park has views of the Seekonk River and India Point and is used for fishing, hiking and walking.
- Bold Point Park is located on Pier Road just south of the I-195/Taunton Ave/Warren Ave. Interchange. The park has a boat ramp, dock, picnic tables and a view of the Providence River.

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

PARKS AND RECREATIONAL AREAS

FIGURE 26

- Veterans Memorial Parkway. On the west side of Veterans Memorial Parkway, there are three separate scenic overlooks on bluffs with views of the Providence River.
- East Bay Bike Path. The popular bike path begins at India Point Park in Providence and continues through East Providence, Barrington, Warren, and Bristol. The bike path was built on an old railroad bed. The bike path is utilized for biking, walking, and roller-blading.

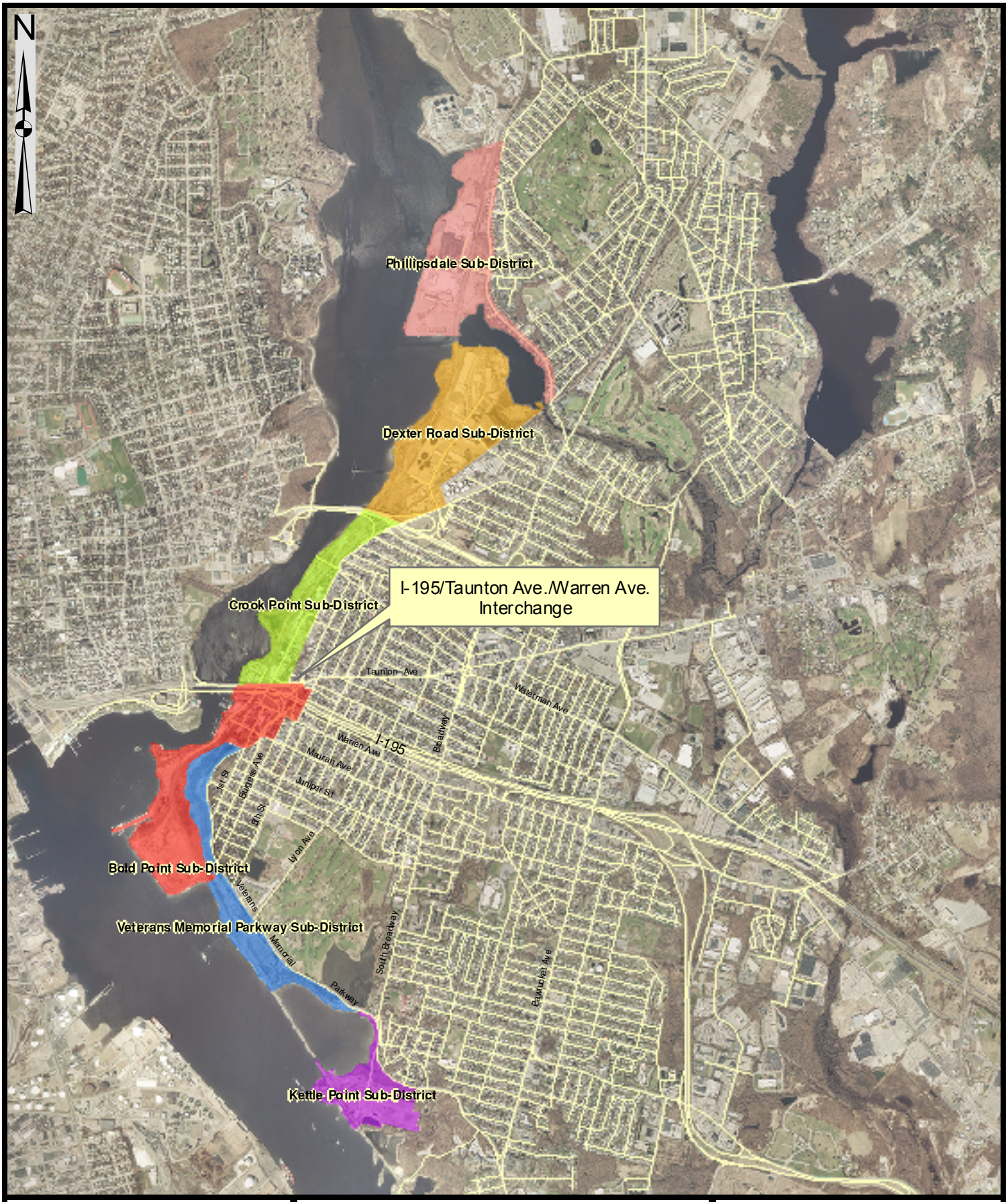
The parks and recreation areas in the study area are not impacted by any of the project alternatives. Access to and from the parks is provided under each alternative. Under the No-build and Upgrade/TSM alternatives, access remains unchanged. Under the build alternatives, access to these areas is enhanced when traveling to or from I-195 to the east of the project area.

4.1.8 Land Use

The No-build and Upgrade/TSM alternatives will not alter the land use in the study area. The interchange alternatives are compatible with existing and proposed land uses in the project area, with some impact to existing land parcels at the proposed roundabout. The build alternatives may enhance opportunities for land use changes in the vicinity of the interchange and along the waterfront by providing access to both directions of I-195. The City of East Providence has plans in place to redevelop and revitalize the waterfront area. Figure 27 shows the Waterfront Special Development District. The construction of the proposed ramps will complete the interstate access at the I-195/Taunton Avenue/Warren Avenue Interchange

Existing land uses in the vicinity of the subject interchange (roughly bounded by Taunton Avenue, Mauran Avenue, Purchase Street and the Seekonk River) are characterized by urban-scale neighborhoods with a mix of residential uses (single-family residential houses, multi-family housing units), retail and commercial (small neighborhood establishments, restaurants, and auto repair), office and light industrial uses. Traffic circulation is accommodated through a grid pattern of two-way streets. Entrance to eastbound I-195 and an exit from westbound I-195, however, are non-existent in this location.

The proposed ramps of the build alternatives are primarily contained within the existing freeway right-of-way. The proposed roundabout at Veterans Memorial Parkway and Mauran Avenue does require property acquisition and the removal of four structures. The land use of these properties will change from a mix of residential/commercial to transportation facilities.



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange

East Providence, Rhode Island

WATERFRONT
SPECIAL DEVELOPMENT
DISTRICT PLAN

0 500 1,000 2,000 3,000 4,000 Feet

FIGURE 27

The three proposed interchange alternatives are context sensitive to the existing land use pattern with carefully located entry and exit ramps and a roundabout "Gateway" at Veterans Memorial Parkway and Mauran Avenue. The alternatives further improve and clarify the physical connections to the interstate system from the surrounding neighborhoods, allowing for more efficient and safer traffic flows while removing automobiles from the local roads that are en route to highway ramps further to the east. The "Gateway" is an important traffic calming and orientation device that provides a landmark element that will improve neighborhood identity and make a clear connection to the waterfront.

Specific to Waterfront Drive 1 and 2, recommended improvements at the Potter Street and Purchase Street bridges have the potential to enhance the physical, social and economic connectivity between the Warren Avenue and Taunton Avenue communities on either side of the highway corridor.

Specific to the Veterans Memorial Parkway alternative, the proposed bike path connection between the Washington Bridge and the East Bay Bike Path will complete a major recreational link between the City of Providence and Rhode Island's East Bay and will have a high positive impact on recreational opportunities for surrounding neighborhoods.

4.1.9 Consistency with Local Planning

Current planning and development initiatives in the area include the 2003 East Providence Waterfront Special Development District, a comprehensively planned area that encompasses approximately 300 acres of underutilized property along the Providence and Seekonk Rivers. Envisioned in the plan is a mix of land uses and densities, including residential, commercial, office, retail and recreational areas. See Figure 27. Based on the anticipated build out scenarios for the mixed-use Waterfront Development District, the interchange alternatives accommodate the potential need for connections by the increased traffic volumes. Successful redevelopment of the waterfront, in conjunction with the improved interchange connections, will provide economic benefits to the surrounding neighborhoods, City, and region.

Comprehensive Development Plan

Adopted in 1992 (State-certified in 1994 and further amended in 2004), East Providence's Comprehensive Plan provides the legislated regulatory and planning framework for the managed growth of East Providence. The three build alternatives support the principles and

goals of this plan by improving traffic patterns, enhancing community cohesion, and anticipating future development of the City.

- The build alternatives do not negatively impact land use considerations as defined in the East Providence Comprehensive Plan.
- The build alternatives do not negatively impact housing considerations as defined in the East Providence Comprehensive Plan, including promotion of orderly residential growth, conservation of neighborhood cohesiveness and provision of equal access for all residents to a range of housing choices.
- The build alternatives do not negatively impact circulation considerations as defined in the East Providence Comprehensive Plan, and, in fact, support many of the goals of improving safety and access; providing transportation that meets the needs of all residents; protecting existing character of streets; coordinating local and regional transportation systems; and improving elements of the circulation system to increase accessibility to I-195 and to enhance the appearance and image of critical entrances to the City.

Secondary Impacts to Development

The build alternatives have positive secondary impacts on foreseeable, induced development in the project area. The build alternatives will provide more direct connections to and from potential development parcels, as well as currently-developed commercial parcels that will benefit from improved traffic flow, both vehicular and pedestrian. Over time, it is anticipated that currently-developed commercial properties, particularly along Warren Avenue, will be upgraded or otherwise enhanced as the Waterfront Special Development District is realized. Additionally, associated improvements to nearby streets, such as new curbs, sidewalks, lighting, planting and street furniture, would be expected to further enhance the character of existing residential neighborhoods. The improved access to I-195 that would be provided by the build alternatives would support the larger mixed-use projects, with housing and commercial components, planned along the waterfront. Traffic volumes related to these developments have been anticipated and incorporated into the traffic modeling for this project as described in Chapter 3.

Relationship to Future Highway System Improvements

In recognizing that future growth may present a need to improve the I-195 freeway corridor, the build alternatives were reviewed relative to potential future widening of I-195. Although there are currently no plans to increase the capacity of I-195 in East Providence, the construction of new bridges over I-195 in each of the build alternatives warrants consideration of potential future endeavors. The placement of the center piers of the new bridges could impact the future alignment of I-195. Review of the build alternatives revealed that the design of the Potter Street Bridge could potentially affect a future widening. The replacements of the Purchase Street and Lyon Avenue bridges do not affect the future widening of I-195, assuming that the center pier of these bridges remain in their current locations.

Should a build alternative be pursued that requires the replacement of the Potter Street Bridge, it is suggested that the design and construction of the new Potter Street Bridge be deferred to the end of the overall construction program. This approach would allow time for additional study on the overall growth and management of the I-195 traffic. The replacement of the Potter Street Bridge is proposed under the Waterfront Drive 1 and 2 alternatives. Under the Veterans Memorial Parkway alternative, the Potter Street Bridge is to be removed but not replaced.

4.1.10 Consideration Relating to Pedestrians and Bicyclists

The No-build alternative does not change conditions for pedestrians and bicyclists. The Upgrade/TSM alternative does include a portion of Warren Avenue, from Broadway to the I-195 eastbound on-ramp at South County Street, where the southerly curb offset is reduced to two feet. A four-foot minimum offset or shoulder area is considered bicycle tolerant.

The Waterfront Drive 1 and 2 alternatives provide ramps to the interstate highway system primarily within the highway right-of-way. Pedestrians and bicyclists are not permitted on the interstate highway and, therefore, the proposed ramps do not affect pedestrians and bicyclists. The intersection improvements that are proposed under Waterfront Drive 1 and 2 will improve safety for pedestrian street crossings and for bicycle travel at those locations. The extension of Taunton Avenue and the proposed roundabout at Veterans Memorial Parkway will improve pedestrian and bicyclist access to the waterfront development from the neighborhoods.

As part of the Veterans Memorial Parkway alternative, a bike path connection is proposed to run from the Washington Bridge southerly along Veterans Memorial Parkway. Currently, the bike path meanders and descends from the Washington Bridge to the intersection of Warren Avenue/First Street. At this point, users travel on First Street to reconnect to the bike path near Veterans Memorial Parkway. The Veterans Memorial Parkway alternative provides a continuous connection of the exclusive bike path and eliminates the use of local streets.

Similar to the Waterfront Drive alternatives, the proposed ramps and intersection improvements included in the Veterans Memorial Parkway alternative do not change conditions for the pedestrians and bicyclists, while the extension of Taunton Avenue and the roundabout do improve pedestrian and bicyclist access to the waterfront.

4.1.11 Visual Impacts

In analyzing of the visual character of the I-195/Tauton Avenue/Warren Avenue Interchange area, landscape character and view sheds were mapped. The landscape character of the area was identified in categories and subcategories defined by the relationship of buildings to open landscape, with the two major categories being "predominantly built form" and "predominantly open landscape." View sheds were mapped using categories of viewers/users defining what observers can typically see from their viewing locations. Thus, for example, separate view sheds were outlined for viewers on highways, on local streets and in residential areas, although the view sheds did overlap.

The No-build and Upgrade/TSM alternatives do not alter the appearance of the study area. The visual impact of the proposed build alternatives was evaluated based on the landscape character, view shed measurements and general aesthetic impact observations.

Landscape Character

The proposed I-195 ramps of the build alternatives are located primarily within the existing highway rights-of-way and within the predominantly open landscape character categories of "open/maintained landscape" and "steep banks/native vegetation." The new ramps will reduce the vegetated area, most noticeably the native vegetation of the steep highway embankments, but will not significantly change the landscape character in most of the impact area.

The extension of Taunton Avenue to Waterfront Drive, combined with the closing of Valley Street and the construction of Waterfront Drive itself, has potential for far greater landscape character change, considering the new development opportunities being brought to the area. Taunton Avenue extension is proposed under each of the build alternatives. The closing of a portion of Valley Street is proposed for Waterfront Drive 1 and 2 and is not required under the Veterans Memorial Parkway alternative.

The roundabout at Veterans Memorial Parkway and Mauran Avenue would increase the area of "open/maintained landscape" as it carves out a broader highway right-of-way from the immediate neighborhood of "small/tightly spaced buildings," and it would be an attractive and identifiable gateway to Veterans Memorial Parkway and to the waterfront area. Changes in this area however, would be generated more from the waterfront development than from the impact of the roundabout itself.

View Sheds

View sheds are essentially unchanged by the proposed build alternatives. The proposed roundabout will provide a minor change with slightly expanded views to east and west Mauran Avenue. Under the Veterans Memorial Parkway alternative, the parallel bike path may add a different viewer experience, but the view shed from the bike path would be the same as that from the highway.

Aesthetic Impacts

Under the Waterfront 1 and 2 alternatives, the proposed eastbound on-ramp would eliminate wooded banks north of School Street, reducing the neighborhood screen and the sense of green in the I-195 corridor. Although there could be some planting along School Street, there would not be enough space to screen the highway or mitigate the impact of the high walls. The existing landscape area of the proposed westbound ramp is wider. The vegetated banks would be reduced, but the impacts of the ramps and their walls would not be as great.

The roundabout would make an attractive gateway to scenic Veterans Memorial Parkway and to Waterfront Drive. However, the required cul de sacs adjacent to the roadway would make for unattractive expanses of pavement with little or no space for effective screening.

The Veterans Memorial Parkway alternative has greater impact on local road connections. Cul de sacs and other road diversions are close to the highway without adequate space for screening. These are also the areas where the highway lighting could spill into the local neighborhoods.

Summary

In general, the proposed interchange improvements would have little impact on the overall visual character and view sheds of project area. They would not seriously compromise the integrity of the adjacent residential neighborhoods, although certain abutters could be affected by traffic changes and the proximity of new roadway features. The proposed roundabout would provide an attractive and identifiable gateway to Veterans Memorial Parkway and the waterfront. Thus, the lower Mauran Avenue area would be affected by this project, although the greater impact would occur as Waterfront Drive and the Waterfront Development District become the catalyst to significant redevelopment in the lower Mauran Avenue, Warren Avenue and the Valley Street sections of the project area.

4.2 Cultural Resource Impacts

4.2.1 Historical Background

The I-195 interchange project area of interest is located along Interstate 195 and East Providence's Seekonk River waterfront. This area is historically known as the Watchemoket area of East Providence. The historic, residential and commercial development in this area was characterized by the crossroads for railroads, bridges and highways. The waterfront consists of residential buildings, small commercial buildings and a variety of industrial/transportation-associated resources. The history of the study area is summarized in Technical Memorandum No. 3, Historical and Archaeological Resources.

Historic Context

Prior to European settlement in the seventeenth century, the area was inhabited by two Native American groups, the federation of Wampanoag Indians and the Narragansett Tribe. European settlements, established in the 1630s, encroached upon the lands of both tribes. This led to hostilities between the colonists and Native Americans and culminated in King Philip's War in 1675-1676, resulting in the defeat of the Narragansetts.

The Europeans established a few permanent buildings such as meeting houses, residences and several businesses. Roger Williams established the first European settlement in Rhode Island in what is now known as the northern section of East Providence. A group of Puritans established a second, permanent settlement in the East Providence area in the 1640's.

By the 1780's, Providence surpassed Newport as Rhode Island's major seaport and the American industrial revolution began with textile mills in Pawtucket, then rapidly spreading throughout the Blackstone Valley and beyond. It was in the 1790's that a series of bridges were built across the Seekonk River to connect Fox Point with Watchemoket, which was destined to become a transportation crossroads for the region. The first permanent bridge to span the Seekonk River was built 300 feet south of the present Washington Bridge, in honor of George Washington. The bridge was destroyed and rebuilt twice between 1807 and 1815, then replaced by a covered bridge in 1820.

The industrial revolution spurred continued growth in the 1830's throughout the entire region. By the turn of the twentieth century, the area was home to nearly 100 businesses. Watchemoket also became the political center of East Providence. The International Order of Odd Fellows Hall on Warren Avenue, built in 1889, was among the many new public and private buildings constructed.

World War I provided a stimulus for the New England textile industry which did not last long as competition from southern mills increased. Once the war was over, the urban core of older cities began to crumble and many families moved to outlying areas which were becoming increasingly suburbanized.

In the early part of the century, the Barrington Parkway was constructed and extended 2.3 miles south along the Seekonk River. After World War II, it was renamed as Veterans Memorial Parkway.

The most drastic changes to the Watchemoket and East Providence landscapes were due to the federal highway programs of the 1950's and 60's in which Interstate 195 was constructed through the middle of East Providence, and as a result, virtually eliminated any remnants of Watchemoket Square. The Washington Bridge No. 200 now connected East Providence with southern Massachusetts. Construction of I-95 and I-195 brought commercial and industrial growth to the area and increased traffic significantly. As a result, a second bridge (Washington Bridge No. 700) was constructed in 1968 to accommodate westbound traffic, allowing the

original bridge to be reconstructed to handle eastbound traffic. Both bridge structures are currently undergoing a major reconstruction.

East Providence continued to grow and between 1945 and 1969, 5,100 homes were built in the area. By 1958, East Providence officially became a city. East Providence attracted many wholesale companies and light industries to the area. New commercial strip development and the construction of several East Providence shopping centers helped the local economy, and during the 1960's, East Providence experienced the second fastest retail sales growth in the state.

4.2.2 Historical Resources

The historic architectural reconnaissance survey determined that the I-195/Warren Avenue/Taunton Avenue Interchange project area of potential effect (APE) contains 490 historic resources that are 50 years old or older. The complete list of these resources, locations and photographs are included in Technical Memorandum No. 3, Historical and Archaeological Documentation. The Technical Memorandum includes 74 previously-surveyed buildings identified in the state inventory files of the Rhode Island Historical Preservation and Heritage Commission (RIHPHC). The identified resources include residential, commercial, industrial, and transportation-related resources along the Seekonk River waterfront, extending eastward along Warren Avenue, and distributed in the residential neighborhoods north and south of the interchange.

A summary of these resources and their relation to the I-195/Warren Avenue/Taunton Avenue Interchange project APE are further described below. See Figure 28 for the locations of the resources.

National Register Listed Properties

Two properties are listed in the National Register as part of the East Providence Multiple Resource Area nomination within the I-195/Warren Avenue/Taunton Avenue Interchange project APE. The properties are described below:

Oddfellow's Hall, 63-67 Warren Avenue. The Oddfellow's Hall, known as the International Order of Odd Fellow's (I.O.O.F.) Hall, was completed in 1889 for the Reliance Lodge #34 of the I.O.O.F., chartered in 1874. Designed by architects Gould & Angell, one of Providence's leading architectural firms in the late nineteenth century, and constructed by

Gordon R. Archibald, Inc.
Professional Engineers

Public Archaeology Laboratory

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

HISTORIC RESOURCES

SCALE 1"=175'

FIGURE 28

contractor John Champlin, the I.O.O.F. Hall cost about $12,000. The building design included rented commercial space on the ground floor, with a second floor meeting hall. The building was listed in the National Register in 1980.

Saint Mary's Episcopal Church, 81 Warren Avenue. St. Mary's Episcopal Church, designed by architect G.E. Harney in the Carpenter Gothic style, was completed in 1870. The Parish was formed in 1871 as a mission of St. Stephen's Church in Providence. Alterations to the church in 1889 included replacement of the original board-and-batten siding shingle sheathing. The church and attached 1914 parish hall were listed in the National register in 1980. The adjacent rectory at 83 Warren Avenue, a Stick Style single family residence, was not included in the 1980 nomination but has been recommended for further survey and evaluation.

Properties Determined Eligible for listing in the National Register

Three properties that are determined eligible for listing in the National Register are located within the Interchange APE.

Washington Bridge No. 200. The southern span of the Washington Bridge is a monumental, multiple-span, reinforced concrete, open spandrel arch bridge completed in 1930. The bridge carries Interstate 195 eastbound over the Seekonk River between Providence and East Providence. It is a major work of concrete bridge engineering, an example of the Colonial Revival style in public works, and was formerly determined eligible for listing in the National Register as part of the Rhode Island Historic Bridge Inventory in 1989.

India Point Railroad Bridge. The India Point Railroad Bridge was constructed in 1902 to carry a line of the New York, New Haven and Hartford Railroad from Providence to East Providence over the Seekonk River. The bridge was taken out of active service in 1974. The India Point Railroad Bridge was designed by the Boston Bridge Works, and in 1993 was one of seven surviving through-truss bridges by this company in existence, one of two in Rhode Island. The bridge was formally determined eligible for listing in the National Register in 1993. The moveable span and pier have been removed to improve navigation in this section of the Seekonk River, leaving the two East Providence approach spans and abutments.

Veterans Memorial Parkway. Veterans Memorial Parkway is a 2.3-mile-long parkway designed by the Olmstead Brothers Landscape architectural firm and constructed in 1910. The RIHPC recommended that Veterans Memorial Parkway be considered eligible for listing in the

National Register of Historic Places. As part of the Rhode Island Designed Landscapes, 1638-Present Multiple Property Nomination, this resource was also recommended as eligible for listing. While boundaries of the resource have not been finalized, the draft nomination indicates a working boundary roughly 60 feet on either side (left and right) of the road centerline. The northern terminus of the resource has never been determined.

Recommendations for Additional Survey and Evaluation

There are four resources previously identified by the RIHPHC as potentially eligible for the National Register:

- Industrial National Bank, 39 Warren Avenue (presently the Comedy Connection)
- Narragansett Electric Substation, Mauran Avenue and Second Street
- Former Oyster Packing house, Water Street.
- Memorial to Bucklin Post No. 20 (statue in front of City Hall).

In addition to these resources, the reconnaissance level survey identified 35 individual resources within the interchange project APE that warrant intensive survey and evaluation to determine whether they may be eligible for National Register listing. In addition, a small cluster of properties bounded by Potter Street, School Street, Purchase Street, and Warren Avenue retain some architectural integrity and may warrant consideration as an historic district.

Impacts

The proposed alternatives considered will require the acquisition of four structures on the vicinity of the Veterans Memorial Parkway and Mauran Avenue. One of these properties is recommended for further survey and evaluation. The East Providence Historic Properties Commission has identified 1 Veterans Memorial Parkway (Map 16, Block 13, Lot 4) as representative of a historic architectural style that is significant at the local level (letter of January 30, 2007), and has indicated that preservation or relocation of the structure would be beneficial to the City. (Please note that this property is referred to as 56 First Street on Figure 25.) Furthermore, the proposed roundabout at Veterans Memorial Parkway requires land from Lot 2 of Block 13 on Map 16, 38 First Street. Approximately 108 SF of land acquisition is required to construct the bike path associated with the Veterans Memorial Parkway Alternative. The structure on 16/13/2 would remain intact, and the lot size would reduce to 4922 SF.

The proposed relocation of the bike path under the Veterans Memorial Parkway Alternative also requires a small amount of property acquisition from the Industrial National Bank, 39 Warren Avenue, Map 16, Block 5, Lot 1. This property is potentially eligible for listing on the National Register of Historic Places. Approximately 859 SF of the 18,801 SF property is required for slope work associated with the bike path. The structure would remain intact.

Each of the build alternatives requires removal or replacement of the Potter Street and Purchase Street bridges over I-195 and construction of a ramp and retaining walls between I-195 and School Street. Construction of these features may result in construction impacts to the small cluster of properties bounded by Potter Street, School Street, Purchase Street and Warren Avenue that have been identified as a potential historic district. Construction impacts are further described in Section 4.3.10.

As project planning and design move forward with a preferred alternative, FHWA and RIDOT will coordinate with the RIHPHC/Rhode Island State Historic Preservation office and other consulting parties under Section 106 regarding project impacts to historic properties that are listed or determined eligible for listing in the National Register and consider ways to avoid, minimize, or mitigate any adverse effects.

4.2.3 Archaeological Resources

A Phase I(a/b) archaeological assessment survey was conducted to identify known archaeological resources, to assess the archaeological sensitivity of the project area and to make recommendations on the need for additional surveys, if warranted. Reference is made to Technical Memorandum No. 3, Historical and Archaeological Documentation, for a detailed account of the Phase I(a/b) archaeological assessment survey.

Information collected during archival research and during a walkover survey was used to predict the locations and types of archaeological sites that could be expected within the project area. A review of archaeological site files at the RIHPHC did not identify any archaeological sites within the project area. A review of historic mapping and, more importantly, historic aerial photographs provided information from which to draw conclusions about the archaeological sensitivity of the project area. Historic development within the corridor has been continuous and extensive with filling, cutting, and construction episodes. The extent of historic period disturbances in the study area associated with industrial, residential, and transportation

development has most likely destroyed the integrity of any pre-contact period archaeological deposits and/or early post-contact period archaeological deposits. Based on the review of available materials, the project area has low archaeological sensitivity and no potential for containing intact archaeological deposits.

4.3 Environmental Impacts

4.3.1 Surface Water and Groundwater Resources

The Seekonk and Providence Rivers are in close proximity to the project area. These water bodies are considered estuarine waters. The water use classification for the Providence and Seekonk Rivers are SB1 (a), which is a Seawater classification defined as follows:

> These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. (RIDEM Water Quality Regulations, 2000).

The proposed project must meet various requirements relative to the water quality characteristics of the Seekonk and Providence Rivers. The general requirements are listed below. These requirements are described in detail in Technical Memorandum No. 4, Wetlands, Water Resources, and Wildlife/Threatened or Endangered Species.

- The proposed project must address the goals of the State of Rhode Island 2004 Section 305(b) State of the State Waters Report with respect to the control of nonpoint sources of pollution in surface water and stormwater runoff.
- The proposed improvement must meet the goals of the Comprehensive Conservation and Management Plan (CCMP) for the estuarine waters of the Providence and Seekonk Rivers. The proposed action will be evaluated relative to potential major sources of pollutants which might discharge into these waterbodies. As the project is further designed, measures will be implemented that contain and reduce the potential toxic pollutants that are generated from surface and stormwater runoff.
- During design, the project will require a Rhode Island Pollutant Discharge Elimination System Program (RIPDES) permit, a stormwater permit and a Water

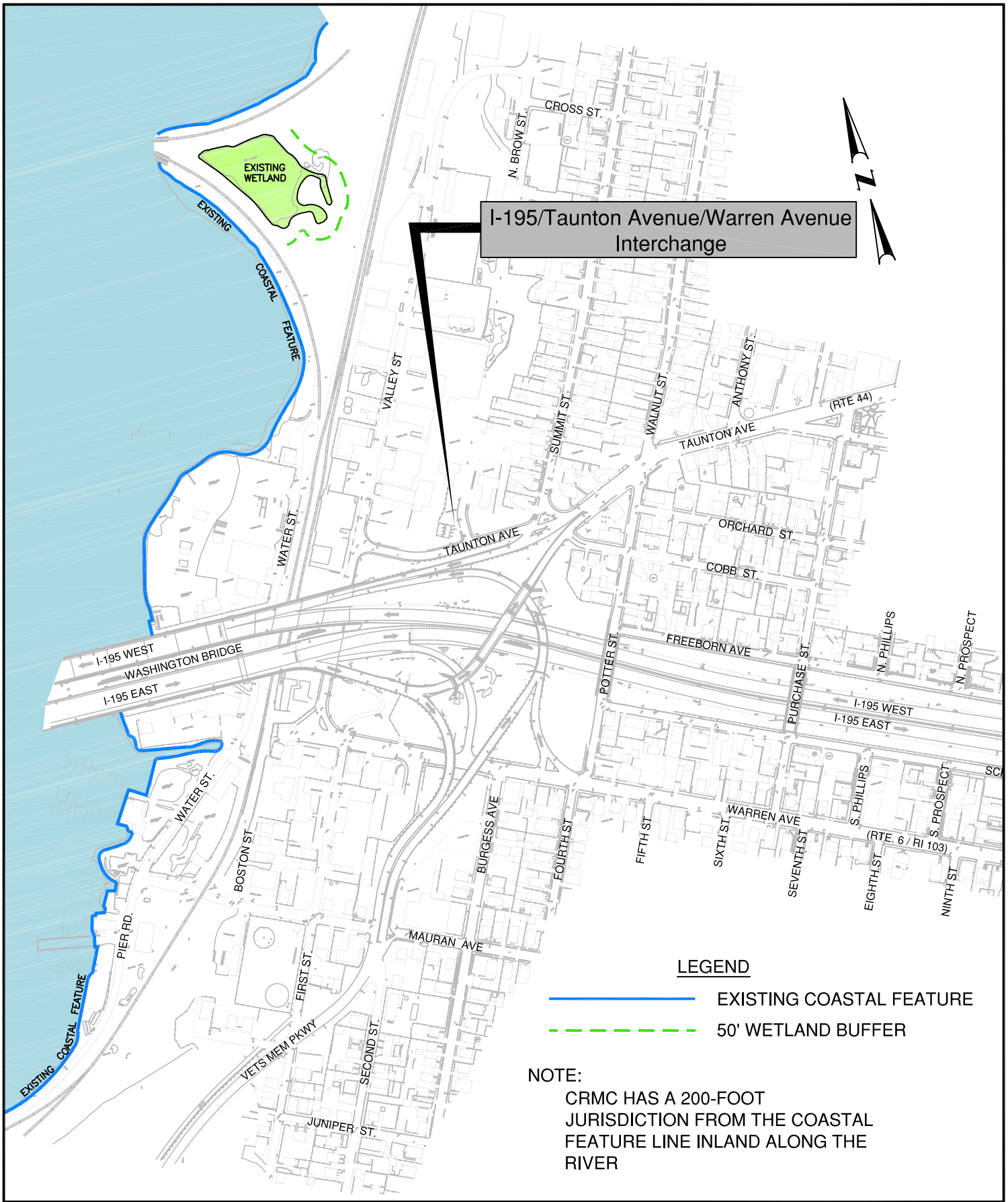
Quality Certification permit through the Office of Water Resources (OWR). To get these permits, the project will have to illustrate that the construction and implementation of this project will not adversely impact the quality of the state's water resources in the upper Narragansett Bay areas of the Providence and Seekonk Rivers.

- Potential non-point sources of pollution from both the construction and implementation of the project will be evaluated and erosion and sediment control measures will be developed as part RIDPES permit process, the Water Quality Certificate applications and any Coastal Resource Management Commission (CRMC) applications.
- The project is within an area that is monitored for surface water quality. Although a permit is not required, design efforts will minimize long and short term impacts to the water quality in the project area.
- Part of the Clean Water Act requires that States identify and list impaired waters as well as develop plans to regulate and improve these waters. The Providence and Seekonk Rivers are listed for bacteria due principally to these waters receiving periodic combined sewer overflows. The project plans will be required to identify potential sources of pollutants and to ensure that these waterbodies are not further impaired by developing measures for containing and remediating bacteria, metals and other pollutants that could possibly run into the watersheds of the Providence and/or Seekonk Rivers.

The No-build and Upgrade/TSM alternatives do not alter the water quality in the project area. No impacts to the water quality of the Seekonk and Providence Rivers are expected from the proposed build alternatives. While new pavement is added under the build alternatives, all water quality requirements are achievable. Best Management Practices will be used in the final design to minimize impacts to water quality. The final design will incorporate a stormwater management system consistent with the Rhode Island Stormwater Design Manual (RIDEM, 1993).

4.3.2 Wetlands

There are wetland areas within the project study area that fall within the jurisdiction of the Rhode Island Department of Environmental Management (RIDEM) and the Coastal Resources Management Council (CRMC). See Figure 29.



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

COASTAL AND
WETLAND FEATURES

SCALE 1"=400'

FIGURE 29

There are two wetlands in the immediate vicinity of the project area. One is the Seekonk River, which is defined by CRMC as Type 4 Water. Type 4 waters are multipurpose waters which support a variety of commercial and recreational activities while maintaining good value as fish and wildlife habitat. A narrow fringe of salt marsh vegetation exists along the riverbank in the southern quadrant of the project area. The dominant vegetation within the wetland is salt water cord grass (Spartina alterniflora). Moving northerly, and just south of the Washington Bridge, there is a small segment of stream/drainage channel. The remainder of the shoreline edge is comprised of retaining walls and bulkheads. CRMC has jurisdiction over the entire riverbank and 200 feet landward of inland coastal features.

A second wetland is located within the northern limits of the project area, west of Valley Street. This freshwater wetland is a pond/forested wetland complex located within a triangular piece of land bounded by the former Wye Railroad Crook Point. The dominant vegetation of this wetland includes sensitive fern (Onoclea sensibilis), pussy willow (Salix discolor), swamp azalea (Rhododendron viscosum), and cinnamon fern (Osmunda cinnamonea). RIDEM has jurisdiction over this one-acre wetland and the 50-foot perimeter.

The No-build and Upgrade/TSM alternatives do not impact wetlands. Likewise, the three proposed build alternatives do not impact freshwater or coastal wetlands. The proposed work is located outside of all state and federally regulated wetland areas and is within the highly developed infrastructure of the existing I-195/Taunton Avenue/Warren Avenue Interchange. No impact to any wetland functions and values are expected.

4.3.3 Wildlife and Vegetation Resources

The project area is in an urbanized section of East Providence and consists of small densely developed residential lots, commercial buildings, and industrial businesses. The wildlife that is encountered in the project area is species that can withstand the pressure of living in habitats that consist of developed lands with a lot of human disturbance. Little vegetation exists for any significant habitat area. More information is provided in Technical Memorandum No. 4, Wetlands, Water Resources, and Wildlife/Threatened or Endangered Species. That Memorandum includes a list of wildlife observed in the study area.

The Seekonk and Providence Rivers support populations of fish and shellfish. Shellfishing in this portion of the Providence River has been closed by RIDEM, and fishing is limited to recreational use only. Essential fish habitat tables are provided in Technical

Memorandum No. 4. Small eastern oysters (Crossostrea virginica) are still observed along the Seekonk River shoreline in the project area. In the early 1900s, many oysters were processed in this area. The oyster fishery collapsed in the mid-1900s and has not recovered. There is no data on other shellfish species in the waters of the project area.

The project alternatives are not expected to impact fish and wildlife or vegetative resources. All of the alternatives are located within the I-195 infrastructure, which is densely developed urbanized area.

4.3.4 Threatened and Endangered Species

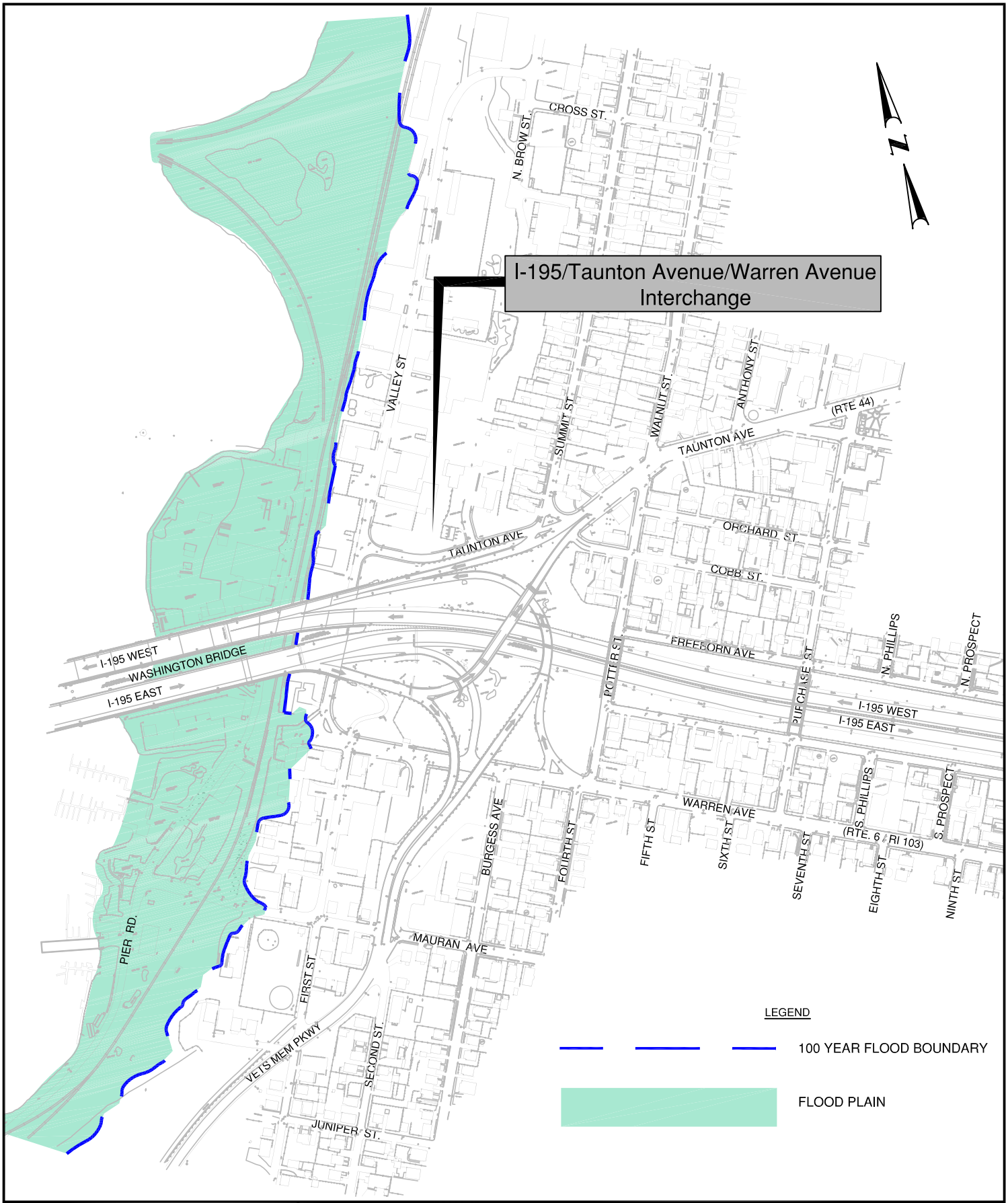
There are no known rare, endangered or threatened wildlife species or rare habitat types within the project area. Letters received from the Rhode Island Natural Heritage Program (RINHP) and the US Fish and Wildlife Service are in Technical Memorandum No. 4, Wetlands, Water Resources, and Wildlife/Threatened or Endangered Species. There are no records of any species of concern within the project limits.

4.3.5 Floodplain Impacts

Floodplains associated with the 100-year flood (Figure 30) are present along the Seekonk River and Providence River within the study area (Federal Emergency Management Agency [FEMA], Flood Insurance Rate Map, Community-Panel Numbers 445398 0002 C and 445398 0003 C). The No-build and Upgrade/TSM alternatives do not impact the floodplain.

Because the project borders the Seekonk River, all three proposed alternatives in the study area would involve work within the 100-year floodplain. The Waterfront Drive 1 & 2 alternatives share the same proposed improvements within the 100-year flood boundary. The new westbound off-ramp under each option extends into the floodplain area at its terminus with Waterfront Drive. Likewise, the Taunton Avenue extension also extends into the floodplain zone at its intersection with Waterfront Drive. In both instances, the proposed roadway requires a cut section and, therefore, will not require filling of the floodplain area.

The Veterans Memorial Parkway alternative also involves the extension of Taunton Avenue, which extends into the floodplain area. As with the other alternatives, the proposed roadway crossing the floodplain is in a cut section and does not fill the floodplain.



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

FLOOD ZONE

SCALE 1"=400'

FIGURE 30

Based on the above analysis, the proposed project does not impact the 100-year floodplain in the project area.

4.3.6 Farmland Impacts

The study area was examined for the presence of active agricultural land and lands suitable for farming under the 1984 Farmland Protection Policy Act (FPPA). The Act serves to protect "prime" or "unique" farmlands or farmlands of "statewide importance" by classifying soils by type, which include more than just active farmlands. The intent is to protect these farmlands from unnecessary conversion to non-agricultural use due to a Federal Action.

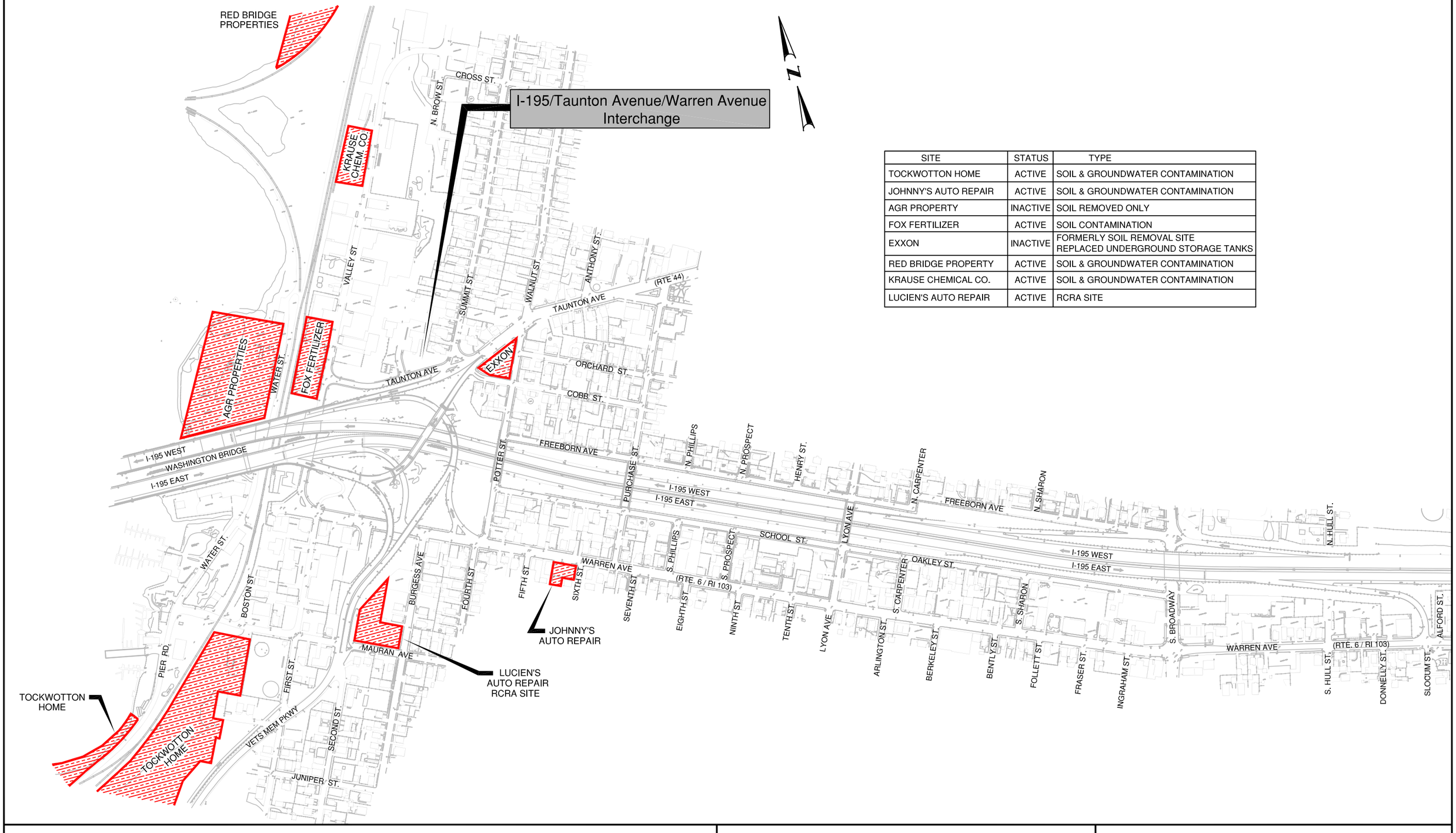
Based upon the Soil Classification Data from the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), and data available in the Rhode Island Geographic Information System (GIS), there are no "prime" or active farmlands within the study area. The only farmland within the vicinity of the study area, deemed as farmland of statewide importance, begins beyond the limit of proposed work on the southern end of Veterans Memorial Parkway. Therefore, none of the project alternatives will impact farmlands.

4.3.7 Hazardous Materials Investigation

A Phase I environmental site assessment has been conducted in the project area to identify hazardous materials likely to be present in the soil and groundwater that may impact construction activities. See Figure 31. Generally, the Rhode Island Department of Environmental Management (RIDEM) does not hold the RIDOT responsible for contamination clean-up within acquired right-of-way. RIDOT is responsible for the construction impacts due to the possible presence of oil and hazardous materials in soil and groundwater rather than the long term ownership liabilities. As such, the hazardous materials study has focused on the potential construction impacts rather than long term ownership liabilities. Coordination between RIDOT and RIDEM on these matters will continue through the design phase of the project.

Each of the proposed build alternatives requires the acquisition and demolition of four buildings, as well as land acquisition. Refer to Sections 4.1.1, Property Acquisition, and 4.1.3, Relocations, for details on the right-of-way actions associated with each alternative.

The Phase I environmental site assessment is described in full in Technical Memorandum No. 5, Hazardous Waste Sites – Initial Site Assessment. The tasks are briefly described below:



SITE	STATUS	TYPE
TOCKWOTTON HOME	ACTIVE	SOIL & GROUNDWATER CONTAMINATION
JOHNNY'S AUTO REPAIR	ACTIVE	SOIL & GROUNDWATER CONTAMINATION
AGR PROPERTY	INACTIVE	SOIL REMOVED ONLY
FOX FERTILIZER	ACTIVE	SOIL CONTAMINATION
EXXON	INACTIVE	FORMERLY SOIL REMOVAL SITE REPLACED UNDERGROUND STORAGE TANKS
RED BRIDGE PROPERTY	ACTIVE	SOIL & GROUNDWATER CONTAMINATION
KRAUSE CHEMICAL CO.	ACTIVE	SOIL & GROUNDWATER CONTAMINATION
LUCIEN'S AUTO REPAIR	ACTIVE	RCRA SITE

Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue Interchange
East Providence, Rhode Island

HAZARDOUS MATERIALS

SCALE 1"=200'

FIGURE 31

- USGS topographic maps were reviewed to assess topography and the likely direction of groundwater flow in the vicinity of the proposed construction activities.
- Site History was assessed through a review of tax assessor's records, Sanborn Fire Insurance Maps, and aerial photography
- Public Agency Information concerning the affected properties was obtained by interviewing state and local officials and reviewing United States Environmental Protection Agency (USEPA) lists and state agency files, including the following:
    - EPA's National Priority List of Superfund Sites
    - EPA's list of CERCLIS Sites designated for possible investigation
    - Leaking and underground storage tanks (LUSTs)
    - Emergency Response incidents and spills involving oil or hazardous materials
    - RCRA-registered facilities that treat, store, transport or dispose of hazardous wastes, and those RCRA facilities subject to corrective action enforcement
    - Sites undergoing remedial efforts under RIDEM oversight
    - Registered above-ground or underground storage tanks (USTs)
    - Solid waste landfills
- Field reconnaissance was conducted in the project area to identify facilities that may potentially use or store hazardous materials or have USTs.

The findings of the initial site assessment (ISA) and the preliminary site investigation (PSI) activities were applied to the three build alternatives. Each of the build alternatives poses concerns relative to hazardous materials. The investigations indicate that gasoline and or other petroleum products may be present in the soil or groundwater at the proposed work sites of each of the three build alternatives.

Leaking USTs were reported at the Exxon Gasoline Station, which is located immediately up gradient of the proposed Taunton Avenue/Valley Street intersection. An active hazardous waste site, Fox Fertilizer, is also located within the proposed work limits in the vicinity of the proposed Taunton Avenue Extension.

Under Waterfront Drive 1 and 2, in the vicinity of the proposed on-ramp to I-195 eastbound from Warren Avenue, leaking USTs were reported at Johnny's Auto Repair. The site is approximately 250 feet from the proposed ramp.

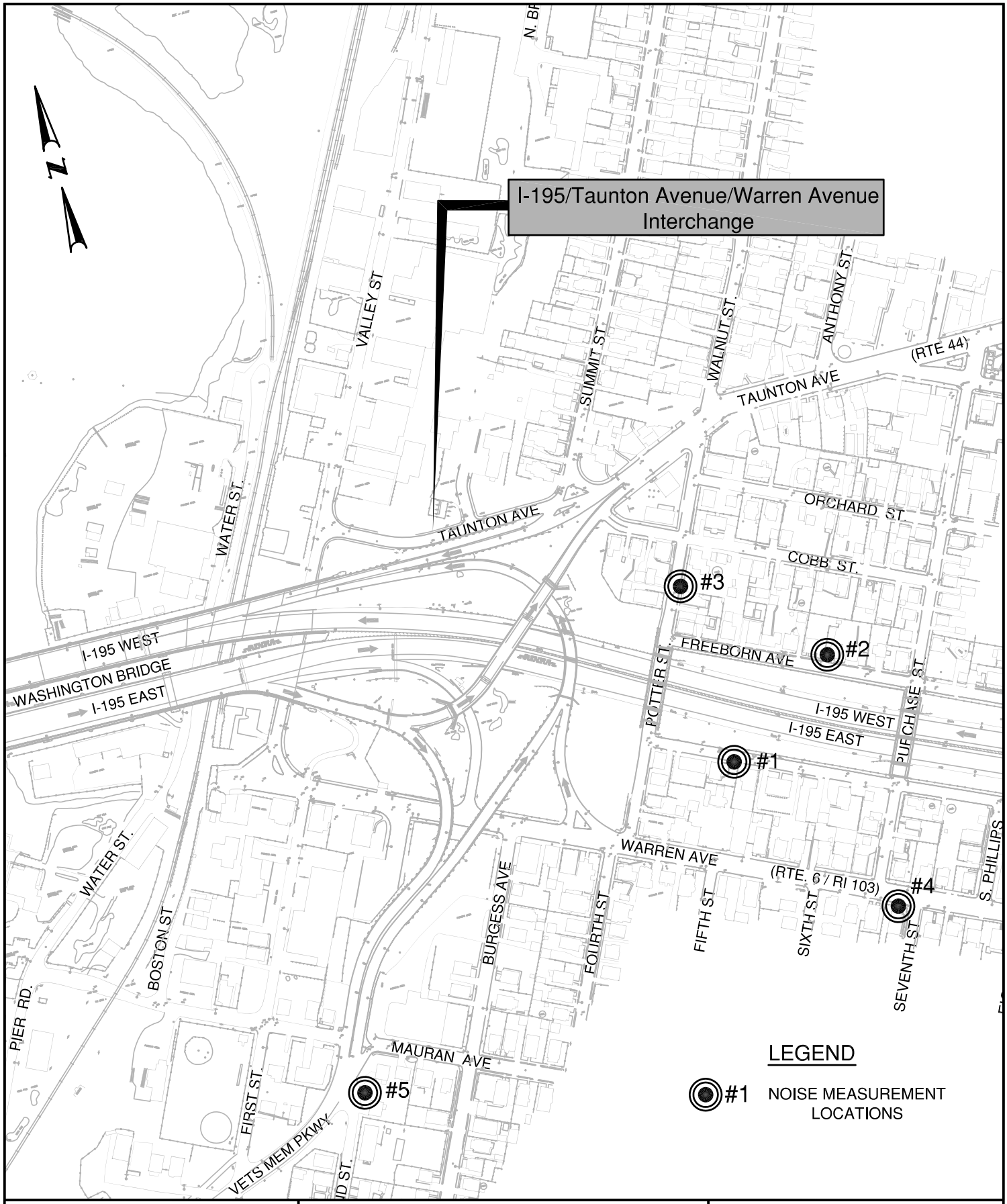
Although specific spills were not uncovered in the vicinity of the proposed roundabout at Veterans Memorial Parkway and Mauran Avenue, there is a RCRA site (Lucien's Auto Repair) located up gradient, where several USTs which have been removed. The Tockwotton Home site, an active hazardous waste site, is located within a quarter-mile of the proposed roundabout. However, that site is believed to be down gradient and is not expected to have an impact on the construction of the proposed roundabout.

Should one of the build alternatives be advanced, Phase II activities are recommended to determine the depth of groundwater at the proposed construction sites. Groundwater observation wells are recommended in the areas of new construction. Soil samples should be collected and screened for volatile organic compounds (VOCs) and other likely contaminants, such as metals and SVOCs. Likewise, groundwater samples should be tested for VOCs and other likely contaminants.

4.3.8 Noise Impacts

A noise study was conducted to determine the potential noise impacts and potential noise mitigation measures associated with project alternatives. The goal of the noise study was to define the existing noise environment, determine the change to the noise environment associated with proposed alternatives, determine the impact of the resulting changes to noise sensitive receptors as defined by applicable standards and criteria, and, where such impacts exist, determine the feasibility and reasonableness of mitigation measures. The noise study and the parameters involved are described in detail in Technical Memorandum No. 6, Traffic Noise Analysis.

A noise model was developed for the project study area. Existing noise levels were measured and traffic volume data was collected. The noise measurement locations are shown on Figure 32. The model was calibrated to represent existing conditions. The loudest hour occurred during the morning peak commuter period. The model was then adjusted to represent the build alternatives both in terms of roadway geometrics and re-assigned traffic. The results are displayed in Table 9.



Gordon R. Archibald, Inc.
Professional Engineers

Improvements to the
I-195/Taunton Avenue/Warren Avenue
Interchange
East Providence, Rhode Island

NOISE MEASUREMENT LOCATIONS

SCALE 1"=300'

FIGURE 32

As the results indicate, all future scenarios are noisier than existing conditions due to the increased traffic volumes. The noise levels associated with the build alternatives vary slightly from one another. Most are within 3 dBA of one another, which is the threshold of perception of most people.

Table 9
Loudest Hour Traffic Noise Summary and Alternative Comparison (L_{eq}, dBA)

Receptor No.	Location	Existing 2005	No-build 2030	Veterans Memorial Parkway	Waterfront Drive 1	Waterfront Drive 2
1	59 School Street	70	71	72	72	69
2	60 Freeborn Avenue	66	69	70	71	70
3	47 Potter Street	65	66	67	67	62
4	131 Warren Avenue	67	68	67	67	68
5	50 Veterans Memorial Parkway	66	72	71	71	71

Based upon RIDOT's relative impact criterion for noise analysis, a difference of 15 dBA or greater is considered as a noise impact. There are no receptors where the increase between existing and future conditions would be 15 dBA or greater. However, according to the Federal Highway Administration Policy, noise mitigation measures should be considered, where reasonable and feasible, for build alternatives where predicted noise levels meet or exceed 66 dBA. This value is met for all of the build alternatives, as well as for the 2030 No-build condition.

Examples of noise mitigation measures include traffic management (reduce speed limits or prohibit truck traffic), alignment alterations to place more space between the freeway and the receptors, acquisition of adjacent property to serve as buffer zones, and noise barriers. Traffic management concepts are not compatible with the function of an interstate highway. Since the study area is densely developed, alignment alterations or acquisition of buffer zones are not reasonable.

The construction of noise barriers will be explored relative to this project. The reasonableness, feasibility, and community acceptance of potential noise barriers will be evaluated.

Construction activities will increase noise levels. These impacts are discussed in Section 4.3.10, Construction Impacts.

4.3.9 Air Quality Impacts

The U.S. Environmental Protection Agency (EPA) uses six "criteria pollutants" as indicators of air quality and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). Motor vehicles make their most significant contributions to three of these pollutants – ozone (a primary component of smog), carbon monoxide (CO) and particulate matter (PM). Areas of the country for which concentrations have exceeded standards are known as "nonattainment" areas. In 1997, EPA changed the ozone and PM standards to measure ozone concentrations over an 8-hour period (rather than a 1-hour period) and to establish standards for fine particulate matter (PM2.5). Areas were newly designated as attainment or nonattainment with these new standards in 2004 and 2005.

The State of Rhode Island is designated a "moderate" nonattainment area for 8-hour ozone, meaning that the state has six years (following its designation in 2004) to develop and implement a plan to improve air quality to meet the national standards. Ozone is not emitted from vehicles directly, but instead forms in the presence of sunlight through a chemical reaction of pollutants, including volatile organic compounds (VOCs) and oxides of nitrogen (NOx), which are components of motor vehicle exhaust. Ozone, therefore, is a problem that occurs at a regional scale as a result of total regional emissions, rather than being a localized concern in the vicinity of high traffic concentrations. The state's plan for meeting the 2010 8-hour ozone standard is due to EPA in 2007. In the meantime, the state continues to implement the provisions of its previously-adopted plan to meet the 1-hour ozone standard. Examples of provisions to reduce emissions from transportation sources include adoption of California low-emission vehicle standards that exceed even the stringent Federal standards; an enhanced vehicle inspection and maintenance program; cleaner-burning reformulated gasoline; and vapor recovery requirements for gasoline dispensing pumps. Emissions are also being reduced substantially from non-transportation sources, such as power plants and manufacturing facilities.

The entire state is in attainment of standards for other criteria pollutants, including CO and PM2.5. During the public outreach process for the I-195 Interchange project, no particular air quality issues of localized concern were identified.

Impacts of Study Alternatives on Emissions and Air Quality

To examine potential future air quality concerns related to this I-195 Interchange Improvement project, potential differences in emissions under the No-build and build alternatives were reviewed, both for the study area as a whole and at a localized (intersection) level.

Total vehicle-miles of travel (VMT) in the study area will vary slightly under each alternative, meaning that emissions will vary slightly as well. Table 11 shows the projected VMT for the Waterfront Drive 1 and 2 alternatives and the Veterans Memorial Parkway alternative, as well as the percent change compared to the baseline (no-build). Table 10 indicates that 2030 VMT will increase by 0.07 percent under Waterfront Drive 1 and 2 alternatives and 0.02 percent under Veterans Memorial Parkway alternative compared to the No-build scenario. These changes are very small and suggest that the air quality impacts of the project will be negligible.

Table 10

Change in Study Area VMT by Alternative

Alternative	Total Study Area VMT	Change vs. No-build	Change vs. 2004
2004	34,946,282		
2030 No-build	45,649,337		30.63%
2030 Alt.1 - Waterfront Drive Scenario	45,682,287	0.07%	30.72%
2030 Alt.2 - Vet. Memorial Parkway Scenario	45,656,297	0.02%	30.65%

The VMT changes should also be set against the backdrop of total changes in emissions between 2004 and 2030. Study area VMT is projected to increase by roughly 31 percent over this time period. On the other hand, cleaner vehicle technology is leading to lower emissions on

a per-vehicle basis. Modeling by the Rhode Island Department of Environmental Management (DEM) shows that emissions per vehicle will be reduced by 73 percent for VOCs, 63 percent for CO, and 85 percent for NOx between 2004 and 2030 as a result of cleaner vehicles and fuel standards that will be achieved under regulations already adopted at the Federal and State level. These changes will more than offset the projected increase in study area VMT, leading to a net decrease in study area emissions of 62 percent for VOCs, 52 percent for CO, and 80 percent for NOx, and indicating that motor vehicles are unlikely to cause future violations of the NAAQS.

Table 11

Rhode Island Emission Factors, 2004 and 2030

Year	VOC	CO	NOx
2004 (grams/mile)	1.18	12.05	1.43
2030 (grams/mile)	0.32	4.43	0.22
Change in Emissions per Vehicle (%)	- 73%	- 63%	- 85%
Change in Total Study Area Emissions (%)*	- 62%	- 52%	- 80%

*Based on 2030 No-build VMT as shown in Table 10. The change under the 2030 build scenarios would be almost identical.

Air quality might also be affected locally, as a result of changes in traffic patterns. In particular, the source of emissions might be shifted from one location to another due to changes in roadway configuration, intersection locations, etc. Quantitative modeling of localized emissions and air quality was not conducted because of its data-intensive and time-consuming nature, and also because no specific issues of localized air quality concern (such as CO "hot spots" at major intersections) were identified in the study process. ("Hot spots," where air pollution standards are exceeded locally, were common in the 1970s and 1980s, but have generally been eliminated as a problem due to the much cleaner nature of vehicles on the road today.) However, a qualitative review was conducted to examine changes in traffic at a sample of three high-volume intersections in the study area: Veterans Memorial Parkway and Mauran Avenue, Taunton Avenue and Walnut/Potter Streets, and South Broadway and Warren Avenue. Total daily traffic volumes are shown for these intersections in Table 12.

Table 12

Traffic Volumes at High-Volume Intersections

	2004	2030 No-build	2030 Waterfront Drive	2030 Veterans Mem. Pkwy
Veterans Memorial Parkway/Mauran Avenue				
Total Traffic Volume (AADT)	18,000	35,000	36,300	44,600
Change vs. No-build		-	4%	27%
Taunton Avenue/Walnut/Potter Streets				
Total Traffic Volume (AADT)	23,000	29,700	30,500	31,200
Change vs. No-build		-	3%	5%
South Broadway/Warren Avenue				
Total Traffic Volume (AADT)	26,300	31,300	30,350	29,750
Change vs. No-build		-	- 3%	- 5%

As Table 12 shows, the largest increase in traffic volumes will occur at Veterans Memorial Parkway and Mauran Avenue under the Veterans Memorial Parkway alternative. The other intersections sampled show either minor increases or decreases in the range of five percent. As previously noted, these shifts in traffic volumes are localized and are not expected to result in significant increases in emissions within the study area. Also as previously noted, the increases in traffic volumes between 2004 and 2030 will be more than offset by reductions in per-vehicle emissions which will occur for 2030 vs. 2004 vehicles (see Table 11), leading to lower emissions in the vicinity of all study area intersections.

This project is listed in the Transportation Improvement Program (TIP) for Fiscal Years 2006-2007 in the "Study and Development" and "SAFETEA-LU Earmarks" sections. On October 3, 2005, the Federal Highway Administration and the Federal Transit Administration jointly found the TIP to conform to the State Implementation Plan (SIP) for air quality. The project was included in the regional emissions analysis that was used to find that the TIP conforms. The TIP is drawn from the State's Long Range Plan "Ground Transportation

2025"which was also found to conform to the SIP on October 18, 2004. Because this project comes from a conforming plan and TIP, no further regional emissions analysis is required.

4.3.10 Construction Impacts

Implementation of the Upgrade/TSM alternative or the build alternatives would result in traffic delays and inconveniences, since construction activities would require the closing of travel lanes and, in some cases, possible closing of freeway ramps. Although efforts will be made to minimize inconveniences, detours will be necessary.

Under the Waterfront Drive 1 and 2 Alternatives, the construction of the I-195 westbound ramp to Waterfront Drive and the construction of the new bridge to carry the existing I-195 westbound on-ramp over the new off-ramp will require that the existing westbound on-ramp be closed for one construction season. This ramp has been closed in the past for an entire construction season, during which time traffic operations were good, as motorists sought other routes.

Each of the three build alternatives requires the removal and replacement of the Potter Street and Purchase Street bridges. Under Waterfront Drive 2 and Veterans Memorial Parkway alternatives, the Lyon Avenue Bridge would also be removed and replaced. To minimize construction impacts, the replacements of these bridges will not occur concurrently. Travel across I-195 will be maintained at all times on at least one bridge.

Other impacts associated with construction activities involve noise and air quality. Elevated noise levels from construction equipment are unavoidable. However, the majority of the construction is expected to be conducted during daytime working hours. In limited situations, construction activities will take place outside of daytime working hours. For example, lane closures on I-195 will likely be required when the piles are being driven to construct the retaining walls adjacent to I-195. This type of construction activity will require careful consideration and strategic planning in order to balance the noise impacts to the surrounding neighborhoods and the traffic congestion and delay encountered by reducing the number of travel lanes.

Major sources of construction noise typically include pile drivers, jackhammers, trucks, cranes, excavating equipment, and miscellaneous support equipment. Potential mitigation techniques for construction noise include limiting construction activity to daytime hours,

ensuring that all diesel-powered equipment has effective mufflers, and erecting temporary noise barriers between construction operations and sensitive receptor locations. Use of alternative construction methods (e.g., using vibratory instead of impact pile drivers) could also reduce construction noise. Since details on construction equipment and scenarios are not known at this phase of the project, specific mitigation measures have not been developed.

Air quality impacts from construction are typically associated with dust created from exposed earth during dry periods. This type of situation, however, is one that is carefully monitored on a RIDOT construction project. Prevention of excessive dust through watering or the spreading of calcium chloride is a requirement.

Erosion during construction, with possible effects on area surface waters, is another concern. Mitigation measures for erosion control will include the use of hay bales, quick stabilization of exposed soil by vegetation and jute netting, sediment traps, and the placement of diversion structures. A program of erosion control measures will be developed during final design and will be required by RIDEM as part of the wetlands permitting process.

4.4 Cost Estimates

A preliminary cost estimate was calculated for each alternative. The estimated construction costs were developed using RIDOT's weighted average prices. Preliminary cost estimates for the Upgrade/TSM alternative and the build alternatives are presented in Table 13. The right-of-way costs shown include both acquisition and relocation costs as estimated by the RIDOT Real Estate Unit. The costs represent 2006 dollars.

Table 13
Summary of Preliminary Cost Estimates

Alternative	Construction	Right-of-Way/Relocations	Total
Upgrade/TSM	$615,000	minor	$615,000
Waterfront Drive 1	$25,300,000	$1,181,500	$26,481,500
Waterfront Drive 2	$38,200,000	$1,181,500	$39,381,500
Veterans Memorial Parkway	$41,900,000	$1,865,500	$43,765,500

4.5 Summary of Social, Economic, Cultural, and Environmental Impacts.

The social, economic, cultural, and environmental impacts of each of the five alternatives are summarized in Table 14.

Table 14
Summary of Social, Economic, Cultural, and Environmental Impacts

Impact	No-Build Alternative	Upgrade Alternative	Waterfront Drive 1	Waterfront Drive 2	Veterans Memorial Parkway
A. Socio-economic					
Property Acquisition					
● Acres Acquired	0	0	1.2	1.2	1.1
● Estimated Cost Incl. Structures	0	0	$1,001,500	$1,001,500	$1,685,500
● No. Parcels Affected	0	0	6	6	10
Annual Tax Loss	0	0	$16,102	$16,102	$17,081
Relocations					
● No. Buildings	0	0	4	4	4
● Estimated Relocation Costs	0	0	$180,000	$180,000	$180,000
Neighborhood & Community Cohesion	Unchanged	Unchanged	For 3 build alternatives, the roundabout somewhat affects a neighborhood in transition. Neighborhood is more notably affected by waterfront district development.		Closure of Potter St bridge affects cohesion. I-195 WB off-ramp to Taunton Ave adds traffic to an already congested area.
Land Use	Unchanged	Unchanged	Each build alternative clarifies and improves the physical connection to the interstate system. The roundabout serves as a traffic calming and orientation device for the waterfront district. Improvements to Potter St & Purchase St enhances the connectivity across I-195.		Bike path completes a major recreational link
Consistency with Local Planning	Does not improve access to the interstate and/or newly planned re-development areas.	Does not improve access to the interstate and/or newly planned re-development areas.	The build alternatives accommodate the potential need for connections to the Waterfront District and support the goals of the comprehensive plan.		
Visual Impacts	Unchanged	Unchanged	Build alternatives have little impact on overall visual character and view sheds. The roundabout is an attractive and identifiable gateway to the waterfront area.		
B. Cultural Impacts					
Historical Resources	No Impact	No Impact	Build Alternatives require removal/replacement of Potter St. & Purchase St. Bridges. This may result in construction impacts to a potential historic district.		Acquisition at 1 property determined eligible for Lis ing in the Na ional Register of Historic Places and at 1 property which requires additional study to determine eligibility.
Archaeological Resources	No Impact	No Impact	No Impact	No Impact	No Impact

Table 14
Summary of Social, Economic, Cultural, and Environmental Impacts

Impact	No-Build Alternative	Upgrade Alternative	Waterfront Drive 1	Waterfront Drive 2	Veterans Memorial Parkway
C. Environmental Impacts					
Surface Water/Groundwater Impacts	No Change to roadway runoff impacts.	No Change to roadway runoff impacts.	Impacts reduced by provision of BMP's.	Impacts reduced by provision of BMP's.	Impacts reduced by provision of BMP's.
Wetlands	No Impact	No Impact	No Impact	No Impact	No Impact
Floodplains	No Impact	No Impact	No Impact	No Impact	No Impact
Vegetation/Wildlife	No Impact	No Impact	No Impact	No Impact	No Impact
Threatened or Endangered Species	No Impact	No Impact	No Impact	No Impact	No Impact
Fishery Resources	No Impact	No Impact	No Impact	No Impact	No Impact
Farmland Impacts	No Impact	No Impact	No Impact	No Impact	No Impact
Hazardous Materials	No Impact	No Impact	Poss ble impacts. Further study required.	Poss ble impacts. Further study required.	Possible impacts. Further study required.
Air Quality Impacts	No Impact	No Impact	No Impact	No Impact	No Impact
Noise Impacts	Noise levels >66dBA. Mitigation to be considered	Noise levels >66dBA. Mitigation to be considered	Noise levels >66dBA. Mitigation to be considered	Noise levels >66dBA. Mitigation to be considered	Noise levels >66dBA. Mitigation to be considered
D. Cost Estimates					
Construction		$615,000	$25,300,000	$38,200,000	$41,900,000
Right-of-Way Acquisition/Relocation Costs		Minor	$1,181,500	$1,181,500	$1,865,500
Total		$615,000	$26,481,500	$39,381,500	$43,765,500

5.0 MITIGATION

Waterfront Drive 2 is the preferred alternative. Some of the consequential impacts of the Waterfront Drive 2 alternative can be remedied to some degree. Potential mitigation is described below:

Property Impacts

The preferred alternative affects six properties and requires the acquisition of four buildings. Given the scale of the project, the consequential property acquisition impacts are minimal. However, it should be noted that the majority of property impacts are associated with the proposed roundabout at Veterans Memorial Parkway and Mauran Avenue. The only mitigation available for these impacts is one of avoidance. Instead of constructing a roundabout, the intersection could be widened and signalized. Although widening and signalization of the intersection would require strip taking along Veterans Memorial Parkway, it would not require the acquisition of structures. The roundabout is recommended, however, because it serves as a gateway to the waterfront area, provides a transition area between the adjacent neighborhoods and the waterfront development, calms traffic, and has a positive aesthetic quality.

Hazardous Material Impacts

The preferred alternative involves construction through property that may be contaminated with hazardous material. Should additional studies reveal that there is soil and/or groundwater contamination, the contaminated material will be properly dealt with during construction and precautions will be taken during construction to protect the workers and to ensure that the contamination is not spread. Excavated contaminated soil will be removed and transported to appropriate offsite facilities, or if the soil meets applicable criteria, the soil will be used elsewhere on the project.

Noise Impacts

The incremental increase in noise impacts is insignificant when comparing the build alternatives to the No-build option. However, the projected noise levels for all of the alternatives are high enough to warrant consideration of mitigation. During the design phase of the project, noise mitigation will be evaluated and implemented where deemed reasonable, feasible, and acceptable by the community.

6.0 PROJECT COORDINATION

6.1 First Round Contacts

At the onset of the project, an informational brochure was prepared and distributed to numerous agencies and individuals. The brochure introduced the project and described the project goals and study approach. The brochure invited recipients to offer comments and provided a comment form. A list of first round contacts is provided in Table 15

Two responses were received following the distribution of the brochure. The Rhode Island Historical Preservation and Heritage Commission responded to identify historic and archaeological resources. The Rhode Island Department of Administration Statewide Planning Program responded with comments relative to the scope to be addressed in the EA.

Table 15
First Round Contact List

1) Mayor Joseph Larisa, Jr.
2) East Providence City Council, Patrick T. Caine, Norman J. Miranda Valerie A. Perry, Assistant Mayor, Peter F. Midgley
3) East Providence Planning Board Chairman, Michael P. Robinson
4) Zoning Board of Review Chairman, Jude Kostas
5) US Senators, Hon. Jack Reed, Lincoln D. Chaffee
6) US Congressmen, Patrick J. Kennedy, James R. Langevin,
7) City Manager William J. Fazioli
8) City Solicitor William J. Conley Jr.
9) State Representatives for East Providence, Paul E. Moura, Elizabeth M. Dennigan, Henry C. Rose, Helio Melo, John A. Savage, Susan A. Story
10) State Senators for East Providence Daniel Daponte, Michael J. Damiani
11) Superintendent of East Providence School Department, Manuel F. Vinhateiro
12) East Providence School Committee
13) Chief of Police, Chief Hubert Paquette
14) Chief of Fire Department, Chief Joseph G. Castro, Jr.
15) Rhode Island Public Transit Authority General Manager, Al Moscola
16) East Providence Housing Authority Executive Director, Dorothy Patti
17) East Providence Chamber of Commerce, Executive Director , Laura McNamara
18) East Providence Downtown Business Association (DBA)
19) Rhode Island Statewide Planning Program, Chief, Mr. John P. O'Brien
20) Rhode Island Department of Environmental Management, Acting Director, Frederick Vincent
21) RI Public Utilities Commission, Chairman, Elia Germani
22) Coastal Resources Management Council, Executive Director, Mr. Grover Fugate
23) Rhode Island Historic Preservation & Heritage Commission, Executive Director, Mr. Edward Sanderson
24) US Army Corps of Engineers, Stephen DiLorenzo, New England District & Robert DeSista, Permits & Enforcement
25) US Environmental Protection Agency, Peter Holmes, Office of Ecosystem Protection & Linda Murphy, Director, Office of Ecosystem Protection
26) US Fish & Wildlife, Greg Mannesto
27) Waterfront District Commission

6.2 Public Hearing

The City of East Providence and the Rhode Island Department of Transportation held a Public Hearing for the project on October 25, 2005, at the East Providence City Hall. The hearing was held from 6:00-9:00 PM with a formal presentation at 7:00 PM. The hearing was advertised in the local newspapers, announced on the City of East Providence's website, and advertised through a brochure that was mailed to approximately 3400 residents and businesses. The brochure mailing list included residences and businesses within a one-half mile radius of the interchange.

Project comments were collected at and after the Public Hearing through a variety of means. Comment forms were included in the brochure, which was available at the hearing, as well as distributed in the pre-hearing mailing. The comment forms could be mailed or turned in at the hearing. The public was invited to offer verbal comments either by speaking as part of the hearing or speaking privately to a stenographer at the hearing. An email address for comments was provided. During the hearing, representatives from the City of East Providence, the Rhode Island Department of Transportation, and the design consultant were available to answer questions and accept comments.

A 30-day comment period followed the Public Hearing. Comment responses were distributed in the form of individual letters from the City of East Providence to 12 persons and/or businesses that offered comments. A summary of the verbal and written comments and the discussions at the Public Hearing is presented below:

Traffic Operations

- Traffic operation problems at Warren Avenue/I-195 eastbound off-ramp cited.
- Traffic operation problems at Broadway/I-195 westbound on and off-ramps/Freeborn Avenue cited.
- Residents on Taunton Avenue indicated that U-turns are routinely made from the eastbound off-ramp to double back to I-195 westbound. There had previously been a "no u-turn" sign at this location but it was not replaced under the off-ramp bridge replacement project.
- Summit Street resident asked for changes to alleviate traffic on Summit Street and to reduce the speed of motorists on Summit Street.
- Summit Street resident complained about the volume of traffic on Summit Street

utilizing the roadway for access to I-195 westbound.

- A resident cited difficulties in the merging of traffic from Warren Ave., Veterans Memorial Parkway and Taunton Avenue onto I-195 westbound and suggested that I-195 ought to be widened to allow these movements to enter the I-195 traffic stream individually.
- A representative from St. Mary's Episcopal Church suggested that a park n ride lot be provided across from St. Mary's to facilitate the motorists that are parking in this vicinity and taking the bus into Providence.
- A resident suggested that the I-195 westbound on-ramp at Broadway ought to be closed. He also suggested that the traffic signal at Warren Avenue/I-195 eastbound off-ramp be removed and that the left turn onto Warren Avenue be prohibited. He cited the use of Mauran Avenue as a short cut and suggested that Mauran Avenue be dead-ended at Lyon Avenue.
- A resident spoke of the traffic congestion on Broadway.

Historic Resources

- Participant questioned whether church on corner of Taunton Ave./Walnut St. and the Catholic Church at the corner of Taunton Ave./Anthony Street ought to be in the category of requiring further evaluation relative to historic resource status.

Extension of Taunton Avenue

- Property owner stated opposition to the extension of Taunton Avenue due to the consequential ROW acquisition that he would encounter.

Veterans Memorial Parkway Alternative

- Residents in the Cobb/Orchard area indicated that people park in their neighborhood and take the Taunton Avenue bus into Providence.
- Residents objected to the I-195 westbound off-ramp to Taunton Ave. since it would bring more traffic to Taunton Avenue. Residents cited concerns over the existing noise and traffic volumes in this area and noted that historic buildings are nearby.
- Representative from Tockwotton felt that this alternative best serves his site. He felt that it provides the best access and is the most pedestrian friendly since it results in

less traffic on Waterfront Drive.

Roundabout at Veterans Memorial Parkway/Mauran Avenue

- Person from Tockwotton was concerned that the roundabout would bring too much traffic to his site.
- Roundabout may allow Mauran Avenue to be used as a cut-through.
- Mauran Avenue resident is opposed to roundabout at Mauran Avenue and feels that it will have adverse impacts on Mauran Avenue.

Waterfront Drive 2

- Suggestion to make Potter Street one-way towards Taunton Avenue to eliminate cross-over traffic from Walnut Street and to provide a ramp to Taunton Avenue.
- Favorable reaction to this alternative. Stressed a need to keep businesses open during construction.

Overall Project

- Warren Avenue resident spoke in favor the build alternatives stating that traffic on Warren Avenue would be alleviated by the build alternatives.
- A resident strongly agreed with the project needs.
- A business owner spoke in favor of the plans.
- A resident spoke in favor of the project and is glad to see that it is proceeding beyond the planning stage.

6.3 Responses to Environmental Assessment Review Comments

The Environmental Assessment was released for review in September of 2007. Comments were received from three agencies including the Rhode Island Historical Preservation and Heritage Commission (RIHPHC), the Rhode Island Department of Environmental Management (RIDEM) – Office of Technical and Customer Service, and the United States Department of Agriculture – Natural Resources Conservation Service. The comments are paraphrased below and responses are provided.

Responses to Comments from Rhode Island Historical Preservation & Heritage Commission

Comment 1: One comment on the cultural resource effect of the various alternatives concerns the Veterans Memorial Parkway alternative. This alternative would result in a significant increase in automobile traffic on the Parkway. It should be noted that this increase in traffic has the potential to adversely affect the pastoral scenic quality of this historic designed landscape. Any potential alterations on the historic parkway to accommodate increased traffic volume should be identified as indirect effects of the Interchange project.

Response 1: *Of the three build alternatives evaluated in the EA, the Veterans Memorial Parkway Alternative does result in the largest increase in traffic on the Parkway. This alternative is not the preferred alternative. All three of the build alternatives include a roundabout on Veterans Memorial Parkway at Mauran Avenue. The roundabout will not only service the traffic at this intersection, but will also provide a visual transition from the highway to the parkway atmosphere. The design, setting, and reduced speed of the roundabout will calm traffic.*

Comment 2: Our other comment concerns both the preferred alternative, Waterfront Drive 2, and Waterfront Drive 1. These alternatives call for new construction along School Street, in an area that is potentially eligible for listing on the National Register of Historic Places as a historic district. We will need more information on both the cultural resources and the proposed construction before we can comment further on the potential effect.

Response 2: *In the EA under Section 4.2.2, Historical Resources, a small cluster of properties bounded by Potter Street, School Street, Purchase Street, and Warren Avenue were recognized as retaining some architectural integrity and warranting consideration as an historic district. At this time, the historic district is not listed on, or determined eligible for listing on the National Register of Historic Places. During final design of the project, RIDOT will continue to coordinate with RIHPHC on this matter. If necessary, additional study of the potential historic district will be*

completed and the construction impacts of the project to the potential historic district will be identified.

Responses to Comments from Rhode Island Department of Environmental Management – Office of Technical & Customer Service

Comments from the Office of Air Resources

Comment 1: Considering the proximity of the project to populated areas, particulate emissions from diesel construction equipment should be minimized. The feasibility of using after treatment controls, e.g. diesel oxidation catalyst or diesel particulate filters, on any diesel equipment should be considered. The use of these particulate control methods to reduce diesel emissions has become economically feasible and has had favorable results. Also, the use of ultra low sulfur diesel fuel, for use in the construction equipment is considered to be feasible.

Response 1: *During final design, these suggestions will be considered when preparing the project specifications.*

Comment 2: As a reminder, the Office of Air Resources has in place Regulation No. 45 entitled "Rhode Island Diesel Engine Anti-idling Program" which limits the unnecessary idling of any on-road or non-road diesel engine. We recommend that formal notification to the contractor be made, stressing anti-idling compliance.

Response 2: *During final design, this regulation will be included in the project specifications.*

Comment 3: Fugitive dust emissions should be minimized with the use of water or other control methods which will minimize nuisance complaints and reduce particulate matter to atmosphere.

Response 3: *Section 907 of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction covers dust control. The contractor on this project will have to abide by these specifications. Furthermore, RIDOT includes a failure-to-comply penalty in the project specifications.*

Comments from the Office of Waste Management

Comment 1: P. 58, Section 4.3.7, "Hazardous Materials Investigation" – It would be helpful if the agreement between RIDEM and RIDOT regarding this project were specifically identified.

Response 1: *There is not a specific agreement written for this project. The text of the EA has been revised to indicate that the Rhode Island Department of Environmental Management (RIDEM) generally does not hold the RIDOT responsible for contamination clean-up within acquired right-of-way. RIDOT is responsible for the construction impacts due to the possible presence of oil and hazardous materials in soil and groundwater rather than the long-term ownership liabilities. These statements are based upon the present and past practice of operation between the agencies. A statement was added to the EA indicating that coordination between RIDEM and RIDOT on hazardous materials will continue throughout the design phase of the project.*

Comment 2: P. 60, last paragraph of Section 4.3.7: In addition for screening for VOCs, soil should also be analyzed in a laboratory for VOCs and other likely contaminants, such as metals and SVOCs. Groundwater should be tested, as well, for all likely contaminants.

Response 2: *Comment noted and, during final design, the soil and groundwater will be tested for VOCs, SVOCs, and other likely contaminants. This section of the EA has been revised accordingly.*

Comment 3: P. 71, "Hazardous Material Impacts": I believe the Environmental Assessment should specifically mention that contaminated soil – and groundwater –must be properly dealt with during construction. For example, after analysis, excavated soil should be removed to the appropriate offsite facility, if appropriate, or used elsewhere on the project, if it meets the applicable criteria.

Response 3: *This section of the EA has been revised to include these suggestions.*

Comment 4: RIDOT should also be cognizant that any contaminant stemming from UST-related sources will have to be addressed under the UST Regulations.

Further, soils which have been characterized as hazardous waste must meet the requirements of the RCRA program.

Response 4: *Comment noted and these regulations will be followed during the testing and construction procedures.*

Responses to Comments from United States Department of Agriculture Natural Resources Conservation Service

Comment 1: On November 7, 2007, our Assistant State Soil Scientist, Jim Turenne, reviewed the Soil Survey of Rhode Island for the area of concern for the I-195/Taunton Avenue/Warren Avenue Interchange in East Providence, RI. Mr. Turenne's review found no soils mapped in the area of concern to be listed as either Prime or State-wide Importance. Most of the area is already committed to urban and sub-urban land use and the area is mainly mapped with human transported soils and urban land. Part of the definition of prime farmland includes the following:

(1) Land Use
Prime farmland is designated independently of current land use, but it cannot be areas of water or urban or built-up land as defined for the National Resource Inventories. Map units that are complexes or associations containing components of urban land or miscellaneous areas as part of the map unit cannot be designated as prime farmland.

Response 1: *Comment noted.*

7.0 SUMMARY

This Environmental Assessment has been prepared to assess the environmental impacts of a range of project alternatives for providing improvements to the I-195/Taunton Avenue/Warren Avenue Interchange in East Providence, Rhode Island.

The existing interchange is not a full-service interchange. There are no connections either to or from the east on I-195. The alternative access/egress route currently favored by motorists takes them through highly traveled arterials and three high-accident intersections. Traffic growth in the study area will continue to worsen traffic operations, affecting both capacity and safety. In addition to normal growth in traffic volumes, significant development of the East Providence waterfront is also expected to take place within the project life for the transportation improvements being planned. Accounting for that planned future development in the project area, traffic is expected to grow by approximately 40-percent by the year 2030. Conditions will deteriorate as traffic volumes increase if measures are not taken.

The No-build alternative does not improve any of the issues noted above and has been included in this study to provide a basis of comparison.

The Upgrade/TSM alternative provides marginal improvements to traffic operations. This alternative does little to address the safety issues and provides no improvement to the interchange. The Upgrade/TSM alternative has little environmental impact associated with it and is relatively inexpensive. It does not, however, meet the stated purpose of the project as it does not improve access to I-195 and does not adequately prepare for the projected growth of the study area. The implementation of this alternative, or the selection of the No-build alternative, is not in concert with the long-range planning presently underway in the City.

The build alternatives do improve access to the interchange, reduce congestion and improve traffic operations in the vicinity of the interchange, reduce accidents with specific intersection improvements, and adequately prepare for the projected growth of the study area.

Waterfront Drive 1 is the least expensive of the build alternatives. Waterfront Drive 1 and 2 each require the acquisition of six properties, with relocations required at four properties. Further study is required to determine the level of hazardous materials impacts that results from these alternatives. Although these alternatives do not significantly increase noise levels, the noise levels in the study area are at a level which warrants consideration of noise mitigation.

The Veterans Memorial Parkway alternative is the most costly of the three build alternatives and has comparable impacts associated with it. For this alternative, acquisition is required at 10 properties, with four requiring relocations. Additional study on one of the properties will be required to determine whether it is eligible for listing on the National Register of Historic Places. Additional study of potential hazardous materials is also necessary, and, like the other build alternatives, noise levels warrant consideration of mitigation. This alternative is more limited in terms of the traffic movements provided since traffic must enter and exit the new ramps via Veterans Memorial Parkway. The connection to Waterfront Drive and areas north of the interchange is more circuitous than under the Waterfront Drive alternatives.

A majority of the public responses were in favor of the project. Regardless of whether people preferred the Waterfront Drive alternatives or the Veterans Memorial Parkway alternative, the overwhelming sentiment was that some form of improvement to the interchange is necessary and that the project is long overdue.

Waterfront Drive 2 has been selected as the preferred alternative. This alternative is a simple design concept, provides good geometry and meets the project purpose and need. The entrance and exit points of the new ramps intersect with key roadways in the study area, i.e., Waterfront Drive and Warren Avenue, leading to logical and convenient routes to the surrounding destinations. The extension of Taunton Avenue and the proposed roundabout at Veterans Memorial Parkway benefit the surrounding street circulation. The project lends well to staged-construction, which is a positive attribute when funding a large-scale project such as this one. The alignments of the new on- and off-ramps provide adequate lengths for vehicle acceleration or deceleration on the I-195. Waterfront Drive 2 was selected because it offers the best balance among the key factors transportation functionality as relates to present and future needs, environmental impacts and costs.

APPENDIX

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
HISTORICAL PRESERVATION & HERITAGE COMMISSION
Old State House • 150 Benefit Street • Providence, R.I. 02903-1209
TEL (401) 222-2678 FAX (401) 222-2968
TTY (401) 222-3700 Website www.preservation.ri.gov

July 18, 2007

Mr. Edward S. Szymanski
Associate Chief Engineer, Office of Environmental Programs
Rhode Island Department of Transportation
2 Capitol Hill
Providence, RI 02903

Attn: Michael Hebert

Re: Improvements to the I-195/Taunton Avenue/Warren Avenue Interchange
East Providence

Dear Mr. Szymanski:

The Rhode Island Historical Preservation and Heritage Commission staff has reviewed the draft environmental assessment for this project. As you know, we have previously commented on the draft cultural resources Phase I survey and our comments have been satisfactorily addressed in a final draft of that report prepared by the PAL.

We have concluded from our review of the draft EA and the PAL report that the documents describes the project area resources and the various alternatives adequately enough to enable us to draw preliminary conclusions on the potential cultural resources effects. One comment on the cultural resource effects of the various alternatives concerns the Veterans Memorial Parkway alternative. This alternative would result in a significant increase in automobile traffic on the Parkway. It should be noted that this increase in traffic has the potential to adversely affect the pastoral scenic quality of this historic designed landscape. Any potential alterations on the historic parkway to accommodate increased traffic volume should be identified as indirect effects of the Interchange project. Our other comment concerns the preferred alternative, Waterfront Drive 2, as well as Waterfront Drive 1. These alternatives call for new construction along School Street, in an area that is potentially eligible for listing on the National Register of Historic Places as a historic district. We will need to review more information on both the cultural resources and the proposed construction before we can comment further on potential effect.

These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions or comments, please contact Richard E. Greenwood, Project Review Coordinator of this office.

Very truly yours,

Edward F. Sanderson
Executive Director
Deputy State Historic
Preservation Officer

Cc: Jeanne Boyle, East Providence Planning Dept.

(070718.02)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
HISTORICAL PRESERVATION & HERITAGE COMMISSION
Old State House • 150 Benefit Street • Providence, R.I. 02903-1209
TEL (401) 222-2678 FAX (401) 222-2968
TTY (401) 222-3700 Website www.preservation.ri.gov

November 6, 2007

Ms. Jeanne Boyle, Director
East Providence Department of Planning and Urban Development
145 Taunton Avenue
East Providence, Rhode Island 02914

Re: Improvements to the I-195/Taunton Avenue/Warren Avenue Interchange
East Providence

Dear Ms. Boyle:

The Rhode Island Historical Preservation and Heritage Commission staff has reviewed the environmental assessment (EA) for this project. As you know, we have previously commented on the draft EA. We have also commented on the draft cultural resources Phase I survey and our comments have been satisfactorily addressed in a final draft of that report prepared by the PAL.

We have concluded from our review of the EA and the PAL report that the documents describes the project area resources and the various alternatives adequately enough to enable us to draw preliminary conclusions on the potential cultural resources effects. Our comments remain as they were after review of the draft EA. One comment on the cultural resource effects of the various alternatives concerns the Veterans Memorial Parkway alternative. This alternative would result in a significant increase in automobile traffic on the Parkway. It should be noted that this increase in traffic has the potential to adversely affect the pastoral scenic quality of this historic designed landscape. Any potential alterations on the historic parkway to accommodate increased traffic volume should be identified as indirect effects of the Interchange project. Our other comment concerns both the preferred alternative, Waterfront Drive 2, and Waterfront Drive 1. These alternatives call for new construction along School Street, in an area that is potentially eligible for listing on the National Register of Historic Places as a historic district. We will need to review more information on both the cultural resources and the proposed construction before we can comment further on the potential effect.

These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions or comments, please contact Jeffrey D. Emidy, Project Review Coordinator of this office.

Very truly yours,

(FOR)

Edward F. Sanderson, Executive Director
Deputy State Historic Preservation Officer

cc: Edward S. Szymanski, RIDOT
Kazem Farhoumand, RIDOT

071106.01

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

Office of Technical & Customer Assistance

Date: November 8, 2007

To: Jeanne Boyle, Director of Planning
City of East Providence

From: Joseph Antonio, Senior Environmental Scientist
RIDEM/Office of Technical & Customer Assistance

On behalf of: Ronald Gagnon, Chief
RIDEM/Office of Technical & Customer Assistance

Re: Comments on Environmental Assessment for Improvements to the,
I-195/Taunto Avenue/Warren Avenue Interchange
RIFAP No. IM-0195(004)

Below are the Department's comments pertaining to the abovementioned proposed development project.

Comments from the Office of Air Resources

(1) Considering the proximity of the project to populated areas, particulate emissions from diesel construction equipment should be minimized. The feasibility of using after treatment controls, e.g. diesel oxidation catalyst or diesel particulate filters, on any diesel equipment should be considered. The use of these particulate control methods to reduce diesel emissions has become economically feasible and has had favorable results. Also, the use of ultra low sulfur diesel fuel, for use in the construction equipment is considered to be feasible.

(2) As a reminder the Office of Air Resources has in place Regulation No. 45 entitled "Rhode Island Diesel Engine Anti-idling Program" which limits the unnecessary idling of any on-road or non-road diesel engine. We recommend that formal notification to the contractor be made, stressing anti-idling compliance.

(3) Fugitive dust emissions should be minimized with the use of water or other control methods which will minimize nuisance complaints and reduce particulate matter to atmosphere.

Comments from the Office of Waste Management

The Office of Waste Management Site Remediation Section has reviewed the Environmental Assessment for Improvements to the I-195/Taunto Avenue/Warren Avenue Interchange with respect to the Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (the Remediation Regulations).

The document, appropriately, provides for investigation and remediation of soils and groundwater within the project area which are found to contain concentrations of hazardous substances that exceed those requiring notification of the RIDEM under the Remediation Regulations. Please note the following specific comments:

1. P. 58, Section 4.3.7, "Hazardous Materials Investigation" – It would be helpful if the agreement between RIDEM and RIDOT regarding this project were specifically identified.

2. P. 60, last paragraph of Section 4.3.7: In addition for screening for VOCs, soil should also be analyzed in a laboratory for VOCs and other likely contaminants, such as metals and SVOCs. Groundwater should be tested, as well, for all likely contaminants.

3. P. 71, "Hazardous Material Impacts": I believe the Environmental Assessment should specifically mention that contaminated soil – and groundwater - must be properly dealt with during construction. For example, after analysis, excavated soil should be removed to the appropriate offsite facility, if appropriate, or used elsewhere on the project, if it meets the applicable criteria.

RIDOT should also be cognizant that any contamination stemming from UST-related sources will have to be addressed under the UST Regulations. Further, soils which have been characterized as hazardous waste must meet the requirements of the RCRA program.

This concludes RIDEM's comments regarding its preliminary findings pertaining to this proposal. I hope this information is of help to you in assessing this proposed project. If you have any questions concerning these findings, I encourage you to set up a pre-application meeting through the Department's Office of Technical & Customer Assistance. Please contact Joe Antonio from this Office at 401-222-4700, x4410 or by email at joseph.antonio@dem.ri.gov to set up an appointment.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
60 Quaker Lane, Suite 46
Warwick, RI 02886
Phone 401.828.1300, fax 401.828.0433

USDA

Helping People Help the Land...

SUBJECT: Important Farmlands / Prime Forest Land – I-195, East Providence

DATE: November 9, 2007

TO: Jeanne Boyle
Director
Department of Planning, East Providence

FILE: 220

Greetings Ms. Boyle,

On November 7, 2007, our Assistant State Soil Scientist, Jim Turenne, reviewed the Soil Survey of Rhode Island for the area of concern for the I-195/Taunton Avenue/Warren Avenue Interchange in East Providence, RI.

Mr. Turenne's review found no soils mapped in the area of concern to be listed as either Prime or State-Wide Important. Most of the area is already committed to urban and sub-urban land use and the area is mainly mapped with human transported soils and urban land. Part of the definition of prime farmland includes the following:

(1) Land use

Prime farmland is designated independently of current land use, but it cannot be areas of water or urban or built-up land as defined for the National Resource Inventories. Map units that are complexes or associations containing components of urban land or miscellaneous areas as part of the map unit name cannot be designated as prime farmland.

Please feel free to contact me if you have any questions.

/s/

ROYLENE RIDES AT THE DOOR
State Conservationist

cc: Reena L. Shaw, NEPA Liaison
Jim Turenne, Assistant State Soil Scientist
Eric Scherer, State Resource Conservationist
Kip Kolesinskas, State Soil Scientist